FACTORS CORRELATED WITH COGNITIVE DIFFICULTIES EXPERIENCED BY CHILDREN WITH EPILEPSY

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A survey was used in this exploratory study to identify and obtain information about the cognitive difficulties experienced by children with epilepsy and the related factors. A total of 74 parents with children with epilepsy participated in the study. The parents provided background information and the cognitive difficulties experienced by their children with epilepsy. The findings show that one of the most dominant cognitive problems experienced by Malaysian children with epilepsy is memory issue. As a whole, the findings shed light on the predominant categories of cognitive impairments that Malaysian children with epilepsy in this study experienced. Besides that, the fact that intervention was found to considerably lessen the cognitive challenges they encountered points to the importance of intervention in enhancing their learning outcomes, which is another noteworthy insight gained from this study.

Keywords: Children with epilepsy, cognitive difficulties, influencing factors

INTRODUCTION

Epilepsy is a chronic non-communicable disease of the brain that affects around 50 million people around the world (WHO, 2022). A prevalence study by a group of researchers in Malaysia clarified that the prevalence of epilepsy in Malaysia is 7.8 per 1000 persons (Fong et al., 2021). Epilepsy is relatively common among children whereby most of them will outgrow the condition before their teens, and, if not, necessary treatments usually ensure a full and healthy life. Guerrini (2006) stated that, several new drugs have been recently introduced but have provided limited therapeutic benefits other than that, treatment and quality of life of children have improved because the syndrome-specific efficacy profile of drugs is better known. He mentioned, heightened awareness that compounds with severe cognitive side-effects and heavy poly-therapies should be avoided. Furthermore, the author stated epilepsy surgery is an important option for a few well-selected individuals, but should be considered with great caution when there is no apparent underlying brain lesion which may interrupt learning.

According to WHO (2022), children with epilepsy experience episodes of seizure as a result of excessive electrical discharges in a group of brain cells whereby different parts of the brain can be the site of such discharges. Epilepsy is defined as having two or more unstimulated seizures and it is one of the world's oldest recognised conditions, with written records dating back to 4000 BCE (WHO, 2022). For children with epilepsy, the seizure that they experienced can oscillate from the briefest lapses of attention or muscle jerks to more

severe and prolonged convulsions. However, the frequency of the seizures also can be varied, from less than one per year to several per day. WHO (2022) confirmed that, one seizure does not signify epilepsy (up to 10% of people around the world have one seizure during their lifetime).

Apart from that, WHO (2022) also said, children with epilepsy tend to have more physical problems such as fractures and bruising from injuries related to seizures and higher rates of psychological conditions, including anxiety and depression. Hence, risk of premature death with epilepsy is up to three times higher than in the general population, with the highest rates of premature mortality caused by epilepsy are found in low- and middle-income countries and in rural areas (WHO, 2022). Causes of death related to epilepsy can include falls, drowning, burns and prolonged seizures, which are potentially preventable if the children with epilepsy received the required treatment (WHO, 2022).

Learning disorders are common among children with epilepsy. Pavlou and Gkampeta (2011) conducted a study about learning disorders (LD) in children with epilepsy. They found that epilepsy interferes with academic performance and daily activities that require reading, writing or mathematical skills in children affected with epilepsy. They mentioned epilepsy is one of the most common serious neurological disorders in childhood and LD are more common in children with epilepsy than in the general population. The risk of cognitive impairment in children with epilepsy is also higher than the general population (Pavlou & Gkampeta, 2011). Parents are important figures for children with epilepsy. Parents face psychological stress (Cousino & Hazen, 2013) attempting to meet the challenges of caring for their sick child.

Having a child is the presence of intractable seizures were associated with greater general parenting stress (Cousino & Hazen, 2013). Based on a comparative study, parents rate their children with epilepsy as having lower health-related quality of life (Baca et al., 2010). Raising a child with epilepsy involved apprehension; and the need for managing higher cost of living due to various physical and psychosocial issues (e.g., special diets, medications and repeated hospitalisations, schooling challenges) (Baca et al., 2010). Financial burden of raising a child with epilepsy could have impacted on the quality of life of the family, and more critically, the quality of life of the child.

PROBLEM STATEMENT

Leonardi and Ustun (2002) mentioned that individuals with epilepsy could improve their quality of life if properly treated. However, globally >80% of them in the developing countries do not receive any treatment at all. Hence, this large percentage of people without proper treatment led to negative consequences on education outcome. Lekoubou et al. (2018) stated epilepsy's major bulk of the direct cost was represented by inpatient treatment, home healthcare, outpatient treatment, and medication costs. To date, household income and expenditure of Malaysian family with children with epilepsy are not known. More importantly, it is not known how these would affect their children's quality of life.

High financial burden such as household costs, medical costs and education costs hinder parents with children with epilepsy to provide necessary extra programmes that may

be needed for children with epilepsy to enhance in their daily life and academic needs. Low-income parents may choose to be dependent on government-subsidised public learning system as not capable to spend extra money for expensive private interventions. This may impact the children with epilepsy's educational needs and at the same time, it could impact their future. According to a cross-sectional quantitative study in Malaysia, average-household-income group had recorded the highest total average cost for rehabilitation services and medicine cost for the direct medical cost for their child with disability (Kamaralzaman et al., 2018). Many of the rehabilitation services are not affordable by low-household-income group.

Some children with epilepsy reported living satisfactory lives while others do not. It is important to have a deeper understanding of the determinants of quality of life and health outcomes as reported by parents, to help researchers envision opportunities to improve manageable aspects of children's quality of life (Ferro et al., 2017). Based on a 28-month prospective cohort study by Ferro et al. (2017), having greater family, classmate, and peer social support, fewer symptoms of child and parents' depression, and higher receptive vocabulary were identified as the most robust predictors of a better cognitive functioning.

Cognitive difficulties can be more debilitating than the seizures and therefore contribute to low quality of life of children with epilepsy (Gauffin et al., 2022). According to Gauffin et al. (2022), cognitive impairments in children with epilepsy are not well-understood whereby the cognitive domains were episodic long-term memory, executive functions, attention, working memory, visual spatial functions, and language. Memory impairment including even subjective memory problems, has been shown to have an impact on quality of life in children with epilepsy. Whilst the cognitive difficulties, most often are not grossly incapacitating but can be expected to interfere with academic performance and leisure activities. Other than that, children who have been on anti-epileptic drugs for prolonged duration are more likely to experience adverse effects of the anti-epileptic drugs, which can hamper their cognitive functions (Nagabushana et al., 2019).

In research by Nagabushana et al. (2019), children with epilepsy with more severe seizures had significantly showed lower energy and reduced cognitive functioning. Nagabushana et al. (2019) mentioned physical restriction has been noted in studies conducted in India which may be explained by the relatively weaker social or infrastructure support system available for children with epilepsy in India. Other than that, children who have been on anti-epileptic drugs for prolonged duration are more likely to experience adverse effects of the anti-epileptic drugs, which can hamper their cognitive functions. Among the negative correlation with duration of anti-epileptic drug intake were energy, anxiety, control, esteem, social activity, and general health.

LITERATURE REVIEW

Epilepsy and its Effects on Cognitive Domain

Epilepsy seizures are defined as abnormal, excessive, or synchronous neuronal activity in the brain characterised by abrupt and involuntary skeletal muscle activity (Minardi et al., 2019). Anti-epileptic drugs are associated with side effects on cognition and behaviour, dose related and chronic toxicity that involve virtually every organ system (Arulsamy et al., 2015). Child

population seizure onset is related to specific risk factors such as positive family history, fever, infections, neurological co-morbidity, premature birth, mother's alcohol abuse, and smoking in pregnancy (Minardi et al., 2019). The most common causes in children are fever and infections of the central nervous system (CNS) (Minardi et al., 2019). Other causes are hypothermia, accidental ingestion of toxic agents, abnormalities of the CNS, genetic and metabolic disorders (phenylketonuria, hypoglycaemia, and hypoglycaemia hypomagnesemia) (Minardi et al., 2019). Overall intellectual ability of children with epilepsy is comparable to the normal children yet they are at greater risk for learning problems and academic under achievement at school (Beghi, 2020).

In Malaysia, epilepsy patients make up 1% of the overall Malaysian population and is still highly misunderstood with poor understanding of the illness due to considered as condition to mythic causes, such as demonic possession that causes the children with epilepsy to have the serious impact on their quality of life in which both children and parents have an appalling experience where more likely will be exposed to derision and humiliation (Arulsamy et al., 2015). Another factor is cost of anti-epileptic drugs (AEDs) which is very high and becomes a burden for parents to meet the costs (Arulsamy et al., 2015). Consequently, the presence of comorbidities affects treatment decisions and can influence learning outcomes (Strzelczyk et al., 2023). Neubauer et al. (2008) added, about 70% of children with epilepsy have cognitive deficits and only about 30% of children with epilepsy become seizure-free under treatment. A prevalence study by Fong et al. (2021) documented that active epilepsy prevalence was 7.8 in 1000 and 4.3 in 1000 persons in Malaysia whereby 0-19 years age group total estimated population were 10,188,199.

According to Arulsamy et al., (2015), the national effort to tackle epilepsy is considered low and is restricted to certain tertiary education institutions. A survey by Arulsamy et al. (2015), indicated that there is a frequent use of traditional treatment among the respondents whereby the children with epilepsy's quality of life is at risk. Assessing quality of life is especially important because children with epilepsy are in critical periods of development during which many cognitive and social skills are being learned whereby failure to develop these skills at developmentally appropriate periods may impair their quality of life as children and later as adults (Austin et al., 1994).

According to Fitts et al. (2019), higher lifetime seizures significantly associated with low school performance in children with epilepsy in Guinea. In spite of that conservative definition of school performance whereby attending without failing and risk of referral bias at an academic centre where children with epilepsy were allowed to self-refer, the study demonstrated that seizure control in this setting could increase the number of children with epilepsy who could attend and stay in school (Fitts et al., 2019). Recurrent seizures may contribute to developmental delays and learning disorders, this is one of several potential mechanisms through which epilepsy could affect education of children with epilepsy (Fitts et al., 2019). Hence, children with epilepsy needed intervention programmes or occupational therapies to boost and nourish their cognitive skills to grasp the level of education that been affected by the epilepsy seizures. In this study, the cognitive difficulties of children with epilepsy will be profiled. Additional, factors correlated will their cognitive profiles will be investigated.

Factors Correlated with Cognitive Difficulties of Children with Epilepsy

Cognitive difficulties in children with epilepsy can be attributed to various factors, including brain lesions, seizures, epileptic dysfunction, and treatment (Helmstaedter, 2013). In some cases of chronic and severe epilepsy, there is evidence of mental decline, indicating that cognitive problems may surface early in the disease progression (Helmstaedter, 2013). Caplan (2013) underscores the significance of epilepsy's impact on cognition, emphasising its crucial role in the overall quality of life for these children. Behavioural issues and psychiatric comorbidities serve as substantial predictors, linking developmental disabilities, low IQ scores, neurological handicaps, and early onset intractable seizures in children with epilepsy. First of all, it is important to realise that the administration of AEDs presents a dual impact on cognitive domains, with both positive and negative effects (Helmstaedter, 2013). Harmon et al. (2019) found that the use of antidepressants was associated with lower cognitive function quality of life in children with epilepsy. In cases of persistent epilepsy, the focus often shifts from merely controlling seizures to addressing the side effects of treatment and other health concerns. Therefore, especially when multiple AEDs are necessary, it is crucial to consider how these medications might affect an epileptic child's cognitive functions and overall development (Helmstaedter, 2013).

Secondly, over time, epilepsy's cumulative impact on a child's cognitive abilities extends to various aspects of thinking, particularly their academic performance (Aldenkamp & Arends, 2004). Early recognition and intervention are essential to prevent long-term issues with thinking and learning (Aldenkamp & Arends, 2004). Certain cognitive functions, such as the ability to learn and retain information over extended periods, are more susceptible to epilepsy's effects, with attention being notably affected (Aldenkamp & Arends, 2004). Sabaz et al. (2000) further categorised cognitive functions into attention or concentration, memory, and language. Challenges in these cognitive aspects may arise from various sources, including brain-related issues, medication, seizures, or social factors influenced by epileptic conditions (Sabaz et al., 2000). Children with epilepsy may grapple with language difficulties, struggle with learning and memory, and face challenges with attention (Gauffin et al., 2022). The impact of memory problems, even if only perceived by the child and not apparent to others, significantly influences an epileptic child's overall cognitive functions (Gauffin et al., 2022).

Thirdly, apart from visible seizures, transient cognitive impairment, occurring between seizures, disrupts learning by affecting basic functions like attention and simple tasks. Tests measuring more complex thinking, such as reaction time, memory tasks, and learning new information, offer insight into how epilepsy affects an epileptic child's cognitive processes (Aldenkamp, 1997). Children with epilepsy often encounter learning issues beyond a slight delay compared to their peers. Some face problems linked to specific brain areas affecting short-term memory, such as children with a scar in the temporal lobe struggling with remembering things for a brief period, like learning new words (Aldenkamp, 1997). Seizures, medications, and fatigue may induce short-term learning problems lasting for a brief duration (WHO, 2022). Children with epilepsy might experience difficulties concentrating, remembering information, and struggle with planning and organisation more than their peers without epilepsy (Gauffin et al., 2022). Recognising that children with epilepsy might face thinking challenges, even if not overtly evident, is fundamentally important. Failing to address these cognitive issues could impede their long-term success in school, work, and social interactions (Gauffin et al., 2022). Therefore, Caplan (2013) strongly

advocates addressing thinking problems as the key to improving the quality of life for children with epilepsy.

PURPOSE OF THE STUDY

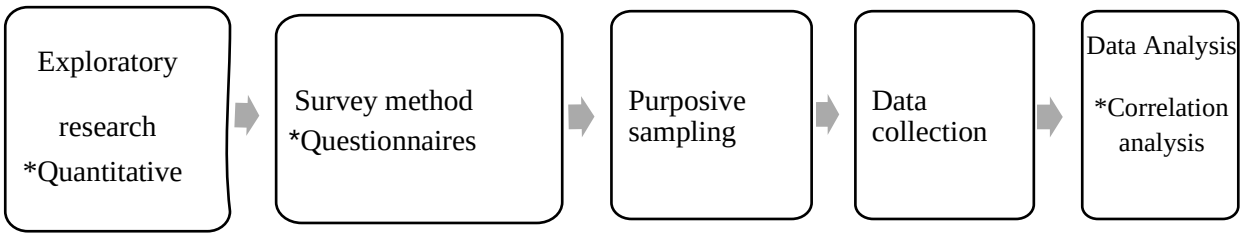
This study aims to identify and gather information about the cognitive difficulties experienced by children with epilepsy and the factors associated with these challenges. The primary objective of this exploratory study was to comprehensively identify and gather insights into the cognitive challenges encountered by children with epilepsy, along with the factors contributing to these difficulties. Utilising a survey methodology, the research aimed to elucidate the multifaceted aspects of cognitive impairment within this population, providing a nuanced understanding of its prevalence, severity, and associated determinants. Ultimately, this study sought to uncover crucial insights that could inform interventions, support systems, and further research endeavours aimed at enhancing the cognitive well-being and overall quality of life for children with epilepsy.

METHODOLOGY

Research Design

This exploratory study utilised a quantitative research design to investigate and gather information about the cognitive difficulties experienced by children with epilepsy and the factors associated with these challenges. As outlined by Akhtar (2016), the steps of quantitative research involve clearly defining the research objective, selecting the method of data collection, determining the sampling strategy, collecting data, and analysing the conclusions obtained. Quantitative designs play a crucial role in advancing knowledge, generating questions, and forming hypotheses for further research (Walker, 2005). In this specific quantitative study, a survey method was employed for data collection, as summarised in Figure 1. The data analysis method involved utilising correlation analysis to examine the relationships within the collected data.

Figure 1
Research Design and Data Collection Method



Location of the Study

The study was at an online setting which was a parent support group at Facebook (social media). Reason for choosing this setting was due to the ease of reaching to parents of children with epilepsy.

Population and Sample of the Study

This study purports purposive sampling as it is fundamental to the quality of data gathered; thus, reliability and competence of the informant must be ensured and suitable used with in quantitative research techniques whereby inherent bias of the method contributes to its efficiency, and stays robust even when tested against random probability sampling (Tongco, 2007). Apart from that, purposive sampling has many views that it is simple and straightforward as there are about its complexity (Campbell et al., 2020). Purposive sampling is 'used to select respondents that are most likely to yield appropriate and useful information' (Kelly, 2010) and with the aim of increasing the depth of understanding (Palinkas et al., 2015). Purposive sampling strategies move away from any random form of sampling and make sure that specific kinds of cases of those that could possibly be included are part of the final sample in the research study (Campbell et al., 2020). Hence, the purposive sampling criteria are: (1) parents of children with epilepsy and (2) seeking treatment in government hospitals.

Table 1

Demographic Information

Factors	Co-factors	Frequency	Percent (%)
1. Parents Education Background	Lower than SPM	1	1.4
	SPM	25	33.8
	Certificate / Diploma	18	24.3
	Bachelor	8	10.8
	PhD	5	6.8
2. Age of Child with Epilepsy	7-9 Years old	22	29.7
	10-12 Years old	40	54.1
	<12 Years old	10	13.5
3. Type of Epilepsy	Generalised Epilepsy	57	77
	Epilepsy and ASD	6	8.1
	Epilepsy and other genetic disorder	4	5.4
4. Parents Income	RM950 - RM1500	5	6.8
	RM1500 - RM2500	39	52.7
	RM2000 - RM3000	30	40.5
5. Intervention Class	No	59	79.7
	Yes	15	20.3
6. Occupational Therapy	No	59	79.7
	Yes	15	20.3
7. Skill-based Classes (art and music)	No	61	82.4
	Yes	13	17.6

A total of 74 parents of children with epilepsy participated in the study. As summarised in Table 1, the sample represented by 1.4% parents with less than SPM (Sijil Pelajaran Malaysia), 33.8% with SPM, 24.3% with Certificate or Diploma, 10.8% with Bachelor and 6.8% with a Postgraduate Degree. The age of their children ranged from 29.7% with 7 to 9 years old, 54.1% with 10 to 12 years old, 13.5% with more than 12 years old and 2 children with missing data. The types of epilepsy conditions include 77% with Generalised Epilepsy, 8.1% with Epilepsy and associated with ASD and 5.4% with Epilepsy and associated with

other genetic disorder. Parents income was categorised under 3 categories which are 68% of RM950 - RM1500, 52.7% of RM1500 - RM2500 and 40.5% of RM200 - 3000. Children with epilepsy who have not attended Intervention class and occupational therapy was 79.7% and 82.4% under skill-based classes (art and music).

Survey Instrument

The section on demographic was adopted and modified from Thomas and Bindu (1999), while cognitive functioning survey was adopted from Goodwin et al. (2015)'s Quality of Life in Childhood Epilepsy Questionnaire: QOLCE-55 Version 1.0 (English). The demographic information comprised 22 items about parents and children with epilepsy, measured using a combination of long-answer text and multiple-choice formats. Parts two through five of the survey included 55 statements, and responses were captured using a 6-point Likert Scale. The cognitive skill questionnaire covered various aspects such as reasoning and problem-solving, making plans and decisions, keeping track of conversations, concentration on tasks and reading, and remembering information about people, locations, and events. It also explored the frequency of reading hours per day and whether the children experienced forgetting something they had planned. The survey questionnaires were administered in both English and Malay.

Procedures of the Study

The survey was conducted with the consent from children with epilepsy's parents. The parents were contacted through Facebook parents support group. Questionnaire were provided for the children with epilepsy's parents to complete the five parts of survey form via Google form that have been sent in Facebook via parent support group named as Malaysian Society of Epilepsy. Number of participants were checked from time to time in Google from via Google Drive to make sure the number of participants is enough for the study.

RESULTS

Cognitive Difficulties Experienced by Children with Epilepsy

The analysis as summarised in Table 2 identify the cognitive difficulties experienced by children with epilepsy. As summarised, Items 4, 5 and 6 with lower mean scores were found to be least affected cognitive skills, while Items 11, 12 and 13 with highest mean scores were found to be most affected cognitive skills. The least affected cognitive skills are difficulty keeping track of conversations (M = 3.16), concentrating trouble on a task (M = 3.18), and difficulty concentrating on reading (M = 3.16). The most affected cognitive skills are trouble remembering where she/he put things (M = 3.62), trouble remembering things people told him/her (M = 3.61), and trouble remembering things she/he read hours or days before (M = 3.63).

Table 2

Descriptive Statistics of Cognitive Functions among Children with Epilepsy

Cognitive Functions	N	Minimum	Maximum	Mean	Std. Deviation
1. had difficulty attending to an activity?	74	1	5	3.22	.832
2. had difficulty reasoning or solving problems?	74	1	5	3.31	.935
3. had difficulty making plans or decisions?	72	1	5	3.28	.953
4. had difficulty keeping track of conversations?	74	1	5	3.16	1.060
5. had trouble concentrating on a task?	74	1	5	3.18	.970
6. had difficulty concentrating on reading?	74	1	5	3.16	.993
7. had difficulty doing one thing at a time?	73	1	5	3.32	1.177
8. reacted slowly to things being said and done?	74	1	5	3.47	1.196
9. found it hard remembering things?	73	1	5	3.45	1.179
10. had trouble remembering names of people	73	1	5	3.55	1.167
11. had trouble remembering where she/he put things?	71	1	5	3.62	1.200
12. had trouble remembering things people told him/her?	70	1	5	3.61	1.207
13. had trouble remembering things she/he read hours or days before?	71	1	5	3.63	1.210
14. planned to do something then forgot?	72	1	5	3.53	1.162
Valid N (listwise)	62				

Factors Correlated with the Cognitive Difficulties among Children with Epilepsy

Table 3 shows the correlation analysis of the cognitive difficulty score and seven key factors of demographic information provided by parents of children with epilepsy. The findings revealed that two demographic factors were associated with cognitive difficulty score reported for the children with epilepsy, namely intervention class ($\chi^2 = 36.88$, $p < .05$) and occupational therapy ($\chi^2 = 40.48$, $p < .05$). As shown in Figures 1 and 2, both the variables showed inverse relationships with cognitive difficulty scores, showing that interventions (i.e., intervention class and occupational therapy) were strongly associated with declines in cognitive difficulty scores.

Table 3

Chi-Square Test Results of Factors with Children with Epilepsy Cognitive Score

		Cognitive score
1. Parents education background	χ^2	167.47
	Sig. (2-tailed)	.057
	N	57
2. Epilepsy child's age	χ^2	101.87
	Sig. (2-tailed)	.785
	N	74
3. Type of Epilepsy	χ^2	39.09
	Sig. (2-tailed)	1.000
	N	67
4. Parents total income	χ^2	95.05
	Sig. (2-tailed)	.060
	N	74
5. Intervention class	χ^2	36.88
	Sig. (2-tailed)	.036*
	N	74
6. Occupational therapy	χ^2	40.48
	Sig. (2-tailed)	.047*
	N	74
7. Skill based classes (art and music)	χ^2	32.57
	Sig. (2-tailed)	.718
	N	74

Figure 1

Changes in Cognitive Difficulty Scores Correspond to the Presence of the Intervention Class

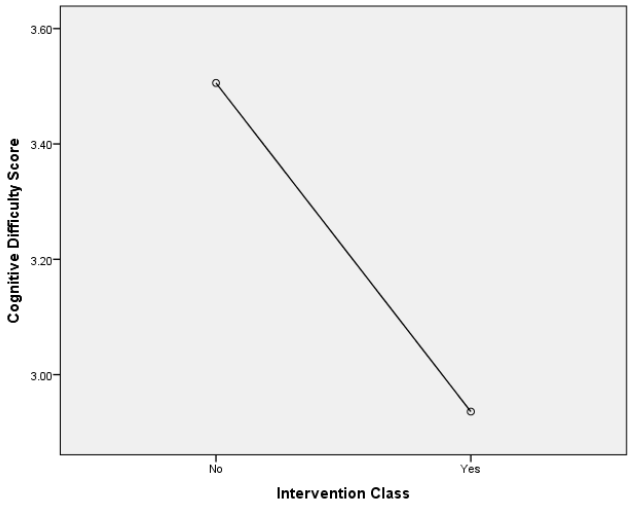
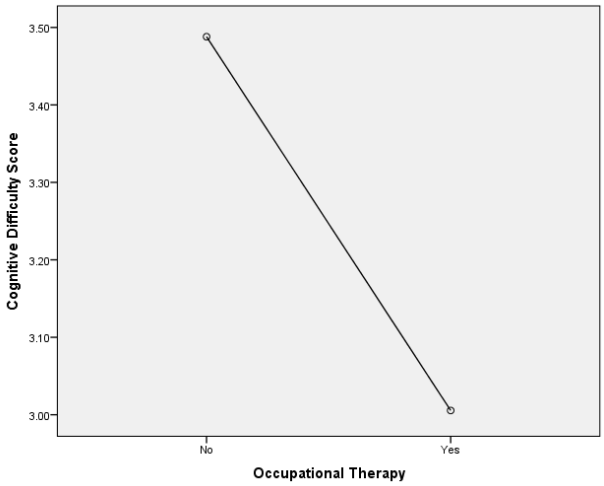


Figure 2

Changes in Cognitive Difficulty Scores Correspond to the Presence of the Occupational Therapy



DISCUSSION

In this article, we aimed to investigate the various factors influencing cognitive difficulty scores in children with epilepsy, including parents' education background, parents' income, the child's age, type of epilepsy, participation in occupational therapies, involvement in intervention programmes, and engagement in arts and music-based classes. This investigation holds particular relevance for Malaysia, where the challenges faced by children with epilepsy have been minimally explored. Two factors emerged as inversely related to children's cognitive difficulty scores: participation in intervention classes and receiving occupational therapy. Our findings underscore the positive impact of interventions in reducing cognitive difficulties among children with epilepsy.

Our study contributes to the growing body of research highlighting the prevalence of memory issues among children with epilepsy. Consistent with previous findings by Kernan et al. (2012), our results indicate that these children tend to perform poorly on delayed verbal memory tasks, including recalling word lists and stories. This underscores the critical need to address memory-related difficulties in interventions designed to enhance cognitive functioning in children with epilepsy. Moreover, the study by Virani et al. (2022) further supports our findings by demonstrating significantly lower performance in both verbal and visual memory among children with epilepsy compared to their healthy counterparts. The identified memory deficits in children with epilepsy emphasise the necessity of targeted interventions aimed at improving memory function. Addressing these memory issues early on may not only alleviate cognitive difficulties but also potentially enhance overall academic and social functioning in this population. Additionally, understanding the specific memory challenges faced by children with epilepsy can inform the development of tailored intervention strategies to effectively address their needs.

Furthermore, our study explored the demographic factors associated with cognitive functioning difficulty scores in children with epilepsy. Notably, both participation in intervention classes and engagement in occupational therapy showed inverse relationships with cognitive difficulty scores, indicating that these interventions were strongly linked to reductions in cognitive difficulty. These findings underscore the potential effectiveness of early interventions in addressing and alleviating cognitive challenges in children with epilepsy. These findings highlight the potential effectiveness of early interventions in addressing and alleviating cognitive difficulties associated with epilepsy. By providing targeted support and interventions at an early stage, healthcare professionals and educators can help enhance cognitive functioning and overall well-being in children with epilepsy.

RECOMMENDATION

The demographic survey conducted among parents of children with epilepsy revealed that the majority of participants did not enrol their children in intervention programmes, occupational therapy, or art and music-based classes. Specifically, 79.7% of the children did not attend intervention classes or receive occupational therapy, while 82.4% did not participate in classes focusing on art or music. The study identified a significant association between parents' income levels and cognitive skill difficulties in children with epilepsy, suggesting that the lack of access to intervention and other therapies contributed to these cognitive challenges. Based on these findings, it is crucial to raise awareness among parents of children with epilepsy about the benefits of enrolling their children in various therapies and intervention programmes. Healthcare providers and educators should provide information and resources to support parents in accessing these services. Additionally, policy makers and healthcare organisations should work towards increasing the availability and affordability of intervention programs and therapies for children with epilepsy, ensuring equitable access for all. By advocating for and facilitating participation in these interventions, we can better support the cognitive development and well-being of children with epilepsy.

Moreover, addressing the identified memory deficits in children with epilepsy is crucial. Healthcare providers and educators should prioritise the development and implementation of evidence-based strategies aimed at improving memory function in this population. Cognitive training programmes, memory enhancement techniques, and tailored educational interventions should be considered to enhance memory encoding, retention, and retrieval. By addressing memory issues early on, we can potentially alleviate cognitive difficulties and enhance overall academic and social functioning in children with epilepsy. Lastly, given the significant inverse relationships observed between participation in intervention classes, engagement in occupational therapy, and cognitive difficulty scores, it is essential to promote access to early interventions for children with epilepsy. Healthcare providers, educators, and policy makers should collaborate to increase awareness about the benefits of early interventions and facilitate access to these services for all children with epilepsy. Efforts should be made to improve the availability and affordability of intervention programmes and therapies, ensuring equitable access for all children affected by epilepsy. By advocating for and facilitating participation in early interventions, we can effectively address and alleviate cognitive challenges associated with epilepsy, ultimately enhancing the well-being of children with epilepsy.

LIMITATION

Regarding the survey, one of the limitations was the potential for selection bias. Since the survey was conducted online within a specific Facebook support group, the findings might not fully represent the diverse experiences of all parents with children affected by epilepsy. Additionally, the survey relied on self-reported data, which could be subject to recall bias, and might not capture the complete spectrum of challenges faced by children with epilepsy and their families. However, measures were taken to ensure validity, such as carefully designing the survey questions and employing standardised scales wherever applicable to enhance the reliability of the responses.

CONCLUSION

In conclusion, this study offers valuable insights into the prevalent cognitive impairments experienced by Malaysian children with epilepsy. Notably, memory issues emerged as the most common challenge faced by the participants. This finding aligns with existing research emphasising the impact of epilepsy on memory function, as documented by Kernan et al. (2012) and supported by the work of Virani et al. (2022). Recognising and addressing memory-related difficulties should, therefore, be a primary consideration in supporting the cognitive well-being of children with epilepsy. One significant finding from our study is the noteworthy impact of intervention on mitigating the cognitive challenges faced by children with epilepsy. The finding that participation in intervention classes and engagement in occupational therapy were strongly associated with declines in cognitive difficulty scores underscores the critical role of targeted interventions. This suggests that early identification and implementation of intervention strategies can play a pivotal role in enhancing the learning outcomes of children with epilepsy.

Overall, the findings from this study contribute to the broader understanding of cognitive difficulties in children with epilepsy, particularly in the context of Malaysia. The insights gained from this study emphasise the need for tailored interventions that specifically address memory-related challenges. Additionally, the positive correlation between interventions and improved cognitive outcomes highlights the potential for targeted support programmes to significantly impact the lives of children with epilepsy, fostering better academic achievements and overall well-being. Moving forward, continued research in this area is essential to refine and expand our understanding of the multifaceted nature of cognitive difficulties in children with epilepsy, ultimately informing more effective interventions and support systems.

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