A Comparative Study between Mono Antiepileptic Therapy and Poly Antiepileptic Therapy Regarding Quality of Life in Adolescents with Epilepsy

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Abstract

Background: Epilepsy is a common neurological disorder in adolescents, often associated with anxiety and depression, significantly impacting their quality of life (QoL). **This study aimed to** assess the QoL of adolescents with epilepsy receiving monotherapy or polytherapy and determine the influencing factors on their health related QoL. **Methods:** This comparative cross-sectional study included adolescent patients with epilepsy, aged 10-18 and with an average IQ of 90-110, from Benha University Hospital and Benha Children Hospital. Patients were divided into two groups: Group I (n = 50): Adolescents with epilepsy receiving mono antiepileptic therapy and Group II (n = 50): Adolescents with epilepsy receiving poly antiepileptic therapy. **Results**: The monotherapy group exhibited significantly lower generalized seizures and fit frequency compared to the polytherapy group. However, QoL domains did not significantly differ between the two groups. In both groups, age, weight, and height showed negative correlations with QoL scores. **Conclusion:** No significant differences in quality of life and social well-being between adolescents with epilepsy receiving mono antiepileptic therapy and those receiving poly antiepileptic therapy. Both treatment groups had comparable scores in the KIDSCREEN-27 domains.

Introduction

Epilepsy is a chronic condition characterized by the recurrence of unprovoked seizures. The International League against Epilepsy (ILAE) defined epilepsy based on at least one of the following conditions: at least two unprovoked (or reflex) seizures occurring more than 24 hours apart, one unprovoked (or reflex) seizure and a probability of further seizures similar to the general recurrence risk (at least 60%) after two unprovoked seizures, occurring over the next ten years or diagnosis of epilepsy syndrome (1).

Anti-epileptic drugs (AEDs) are the most used treatment for epilepsy. They help control seizures in around 7 out of 10 people. AEDs work by changing the levels of chemicals in your brain. They do not cure epilepsy but can stop seizures happening (2).

A significant proportion of these children will experience either anxiety or depression. The burden of psychiatric comorbidity in children and adolescents with epilepsy is significant, leading to increased morbidity and impact on patients and their families (3).

Quality of Life (QoL) is defined by the World Health Organization as 'the individual's perception of their position in life, in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards, and concerns'. It has been shown that Quality of Life (QoL) is influenced primarily by psychosocial variables and the individual's physical and mental characteristics and cannot be attributed solely to physical health (4).

The goal of the treatment of epilepsy is to achieve a significant reduction in seizure frequency or complete seizure control without adverse drug reactions as well as to ensure the best Quality of Life for the child (5).

The purpose of this study was to assess the quality of life of patients with epilepsy receiving mono antiepileptic or poly antiepileptic and determine factors and predictors affecting health related quality of life of them.

Patients and methods

This comparative cross-sectional study included adolescent 100 patients with epilepsy. They were selected from the pediatrics department Benha University Hospital and Benha Children Hospital during the period from 1st May to 30th November 2022 (7 months).

Inclusion criteria were adolescent patients with epilepsy, age (10-18) and average IQ (90-110).

Exclusion criteria were serial or uncontrolled fits, age < 10, age > 18, other comorbidities such as cognitive impairment, sickle cell stroke, cerebral palsy, psychiatric disorders, and other chronic conditions, inability to understand the questions and did not give consent/assent, mental retardation or any comorbid neurological, psychiatric, or medical condition.

Patients:

Patients were divided into two groups: **Group I (n = 50):** Adolescents with epilepsy receiving mono antiepileptic therapy and **Group II (n = 50):** Adolescents with epilepsy receiving poly antiepileptic therapy.

Methodology:

All studied cases were subjected to: **Detailed clinical history:** A detailed history was taken from each patient,

which included information such as perinatal history, gender, birth weight, age of onset of fits, age of starting treatment, possible cause and diary of fits. **General Examination:** A general examination was done to exclude congenital anomalies.

Quality of Life Assessment using the KIDSCREEN-27 (short Version):

Quality of life (QoL) is an important outcome measure in healthcare, particularly for chronic conditions such as epilepsy. QoL assessment helps to determine how well a patient is functioning and coping with their illness and can help healthcare providers identify areas of concern and tailor interventions accordingly. In our study, the KIDSCREEN-27 (short version) will be used to assess QoL in adolescent patients with epilepsy (6).

The KIDSCREEN-27 was developed as a shorter version of the KIDSCREEN-52, which is a well-established QoL measure for children and adolescents. The KIDSCREEN-27 retains the ten original dimensions of the KIDSCREEN-52 but merges them into five dimensions to allow for detailed profile information for Physical Well-being, Psychological Well-being, Autonomy & Parent Relation, Social Support & Peers, and School Environment (7). The KIDSCREEN-27 consists of 27 items, with responses given on a 5-point Likert scale (1=never, 5=always); Physical Well-Being (5 items), psychological Well-Being (7 items), autonomy and Parent Relations (7 items), peers and Social Support (4 items), and school environment (4 items). The questionnaire is self-administered and takes approximately 10-15 minutes to complete (8).

A written informed consent was obtained from all the parents or the patients' guardians. This study was approved by the ethical committee of Faculty of Medicine, Benha University (Approval code: Ms.4-6-2022).

Statistical analysis

We used SPSS v28 (IBM Inc., Armonk, NY, USA) for data analysis. Quantitative data's normality was assessed via the Kolmogorov-Smirnov test and data visualization. Means and standard deviations or medians and ranges summarized the data based on normality. Categorical data were presented as numbers and percentages. Group comparisons employed t-tests or Mann-Whitney U tests for numerical data and Chi-square tests for categorical data. Pearson's or Spearman's correlations were applied as needed. Total QOL scores were compared by gender and seizure type using t-tests. Significance was set at $p < 0.05$ for all tests.

Results

Our study included adolescent patients with epilepsy who were selected from Pediatrics Departments at Benha University Hospital and Benha Children Hospital.

No significant differences were reported between the studied groups regarding age (P = 0.865), gender (P = 1.0), birth weight (P = 0.265), weight (P = 0.826), and height (P = 0.799) (Table 1)

No significant differences were reported between the studied groups regarding TLC, neutrophils, lymphocytes, hemoglobin level, and platelets. The monotherapy group demonstrated significantly lower generalized seizures (20% vs. 70%m, P < 0.001) and frequency of fits per year (3 ±1 vs. 6 ±2, P < 0.001). No significant differences were observed regarding the diary of fits, possible cause, age of onset, and age of treatment (Table 2)

The domains of the KIDSCREEN-27 did not significantly differ between the mono and polytherapy groups, including physical activities and health (P = 0.178), general mood and feelings (P = 1.0), family and free time (P = 0.731), friends (P = 0.241), school and learning (P = 0.139), and the total score (P = 0.672) (Figure 1).

In the monotherapy group, significant negative correlations were observed between the total score and age, weight, and height. No significant correlations were observed with other parameters. In the polytherapy group, significant negative correlations were observed between the total score and age, weight, and height. No significant correlations were observed with other parameters (Table 3).

In the monotherapy group, no significant correlations were observed between physical activities and health score and other parameters. In the polytherapy group, no significant correlations were observed between physical activities and health score and other parameters (Table 4).

In the monotherapy group, the general mood and feelings score showed a significant negative correlation with age, weight, and height. No significant correlations were observed with other parameters. In the polytherapy group, the general mood and feelings score showed a significant negative correlation with age, weight, height, age of onset of fits (P = 0.036), and age of starting treatment. No significant correlations were observed with other parameters (Table 5).

There was no significant difference between both groups as regard Autonomy & Parent Relation, Social Support & Peers, and School Environment (Table 6).

Table 1: General characteristics of the studied groups

		Monotherapy Group (n = 50)	Polytherapy Group (n = 50)	P-value
Age (years)	Mean ±SD	14 ±2	14 ±2	0.865
Gender **Males**	n (%)	25 (50)	25 (50)	1.0
Females	n (%)	25 (50)	25 (50)	
Birth weight (kg)	Mean ±SD	3 ±0.4	3.2 ±0.7	0.265
Weight (kg)	Mean ±SD	46.6 ±7.3	46.3 ±7.2	0.826
Height (cm)	Mean ±SD	158 ±10	157 ±9	0.799

Table 2: Laboratory findings and seizure characteristics in the studied groups.

		Monotherapy Group (n = 50)	Polytherapy Group (n = 50)	P-value
TLC (cells/µL)	Median (range)	9.95 (3.7 - 21.8)	9.55 (4 - 21.8)	0.392
Neutrophils (cells/µL)	Median (range)	6.77 (2.33 - 18.312)	6.2 (2.08 - 18.312)	0.291
Lymphocyte (cells/µL)	Median (range)	2.1 (0.89 - 5.16)	1.9 (0.6 - 5.16)	0.383
Hemoglobin (g/dl)	Mean ±SD	10.74 ±1.33	11.05 ±1.24	0.232
Platelet count (cells/µL)	Median (range)	189 (33 - 362)	194 (123 - 337)	0.336
Type of seizures				
Focal	n (%)	40 (80)	15 (30)	**<0.001***
Generalized	n (%)	10 (20)	35 (70)	
Diary of fits	n (%)	50 (100)	50 (100)	-
Possible cause				
Fever	n (%)	1 (2)	0 (0)	0.638
Genetics	n (%)	6 (12)	4 (8)	
Head trauma	n (%)	1 (2)	2 (4)	
Infection	n (%)	1 (2)	0 (0)	
Unknown	n (%)	41 (82)	44 (88)	
Age of onset (years)	Median (range)	6 (3 - 14)	6 (3 - 11)	0.953
Age of treatment start (years)	Median (range)	6 (3 - 14)	6 (3 - 11)	0.953
Frequency of fits/year	Mean ±SD	3 ±1	6 ±2	**<0.001***

* Significant P-value

Table 3: Correlation between KIDSCREEN-27 total score and other parameters in the monotherapy and polytherapy groups.

Monotherapy group	r	P
Age (years)	-0.414	**0.003***
Birth Weight (kg)	0.077	0.594
Weight (kg)	-0.405	**0.004***
Height (cm)	-0.349	**0.013***
Hemoglobin level	0.085	0.559
Frequency of fits (year)	-0.092	0.525
TLC	-0.054	0.711
Neutrophils	-0.007	0.964
Lymphocyte	-0.004	0.976
Platelet count	-0.21	0.144
Age of onset of fits (years)	-0.116	0.423
Age of starting treatment (years)	-0.116	0.423
Polytherapy group	r	P
Age (years)	-.844	**<.001**
Birth Weight (kg)	0.139	0.336
Weight (kg)	-.813	**<.001**
Height (cm)	-.755	**<.001**
Hemoglobin level	0.2	0.163
Frequency of fits/year	-0.006	0.966
TLC	-0.197	0.170
Neutrophils	-0.17	0.239
Lymphocyte	-0.196	0.172
Platelet count	-0.056	0.702
Age of onset	-0.264	0.064
Age of treatment start	-0.264	0.064

* Significant P-value; TLC: Total leucocyte count; r: Correlation coefficient

Table 4: Correlation between physical activities & health score and other parameters in the monotherapy and polytherapy groups.

Monotherapy Group	Physical Activities & Health	
	r	P
Age (years)	-0.013	0.931
Birth weight (Kg)	0.016	0.91
Weight (kg)	0.051	0.728
Height (cm)	0.011	0.942
Hemoglobin	-0.18	0.21
Frequency of fits /year	0.021	0.887
TLC	0.033	0.819
Neutrophils	0.032	0.824
Lymphocyte	-0.105	0.469
Platelet count	-0.008	0.954
Age of onset of fits (years)	-0.02	0.889
Age of starting treatment	-0.02	0.889
Polytherapy Group	Physical Activities and Health	
	r	P
Age (years)	-0.24	0.093
Birth weight (KG)	0.026	0.859
Weight (kg)	-0.237	0.097
Height (cm)	-0.115	0.428
Hemoglobin	-0.066	0.648
Frequency of fits /year	-0.225	0.116
TLC	-0.077	0.593
Neutrophils	-0.05	0.732
Lymphocyte	-0.085	0.556
Platelet count	-0.11	0.446
Age of onset of fits (years)	-0.218	0.129
Age of starting treatment	-0.218	0.129

TLC: Total leucocyte count; r: Correlation coefficient

Table 5: Correlation between general mood and feelings score and other parameters in the monotherapy and polytherapy groups.

Monotherapy Group	General Mood and Feelings	
	r	P
Age (years)	-.361	**0.01***
Birth weight (KG)	0.071	0.623
Weight (kg)	-.337	**0.017***
Height (cm)	-.290	**0.041***
Hemoglobin	0.196	0.172
Frequency of fits /year	0.001	0.993
TLC	-0.123	0.396
Neutrophils	-0.079	0.586
Lymphocyte	-0.047	0.748
Platelet count	-0.233	0.103
Age of onset of fits (years)	-0.062	0.667
Age of starting treatment	-0.062	0.667
Polytherapy Group	General Mood and Feelings	
	r	P
Age (years)	-.846	**<.001***
Birth weight (KG)	0.12	0.407
Weight (kg)	-.811	**<.001***
Height (cm)	-.756	**<.001***
Hemoglobin	0.18	0.212
Frequency of fits /year	0.013	0.929
TLC	-0.069	0.633
Neutrophils	-0.118	0.416
Lymphocyte	-0.073	0.613
Platelet count	-0.058	0.691
Age of onset of fits (years)	-.297*	**0.036***
Age of starting treatment (years)	-.297*	**0.036***

*Significant P-value; TLC: Total leucocyte count; r: Correlation coefficient

Table 6: Comparison between the studied groups according to autonomy, and parent relation and home life, social support & peers, and school Environment

		Monotherapy (n = 50)	Polytherapy (n = 50)	P-value
Autonomy	**Mean ±SD**	49.24 ± 5.80	50.3 ± 6.64	0.397
Parent relation and home life	**Mean ±SD**	51.22 ± 6.13	50.98 ± 6.96	0.855
Social Support & Peers	**Mean ±SD**	50.12 ± 6.66	49.8 ± 6.11	0.798
School Environment	**Mean ±SD**	49.56 ± 5.92	50.1 ± 6.30	0.657
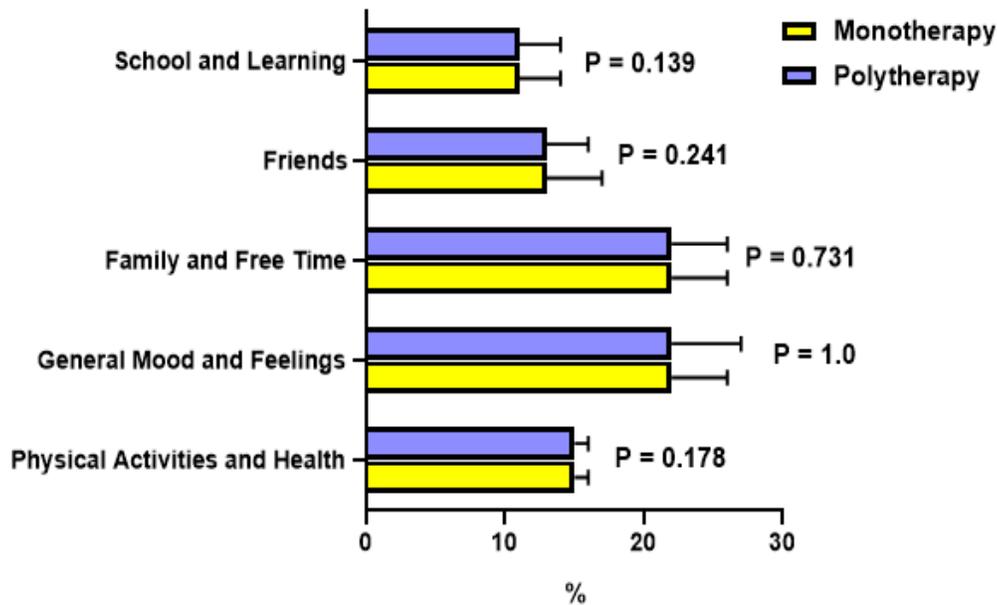
Fig. 1: KIDSCREEN-27 domains in the studied groups

Discussion

Health-related quality of life (HRQL) focuses on the impact of health on a person's ability to live a fulfilling life. HRQL represents a broad concept of physical and psychological with social functioning and well-being that includes both positive and negative aspects. For people with chronic medical conditions such as Arthritis and other rheumatic diseases, this also includes how their disease and treatment affect disability and everyday function. Patient centered outcome questionnaires are commonly used to assess and monitor HRQL (9).

Several studies have reported similar findings of no significant differences between monotherapy and polytherapy groups in terms of laboratory findings. For instance, a study found no significant difference between monotherapy and polytherapy groups regarding complete blood count

parameters, including leukocyte count, neutrophil count, lymphocyte count, hemoglobin level, and platelet count (10, 11).

Similarly, a study found that patients treated with monotherapy had a lower risk of seizure relapse than those treated with polytherapy (12).

In contrast, some studies have reported no significant difference in seizure control between monotherapy and polytherapy. A meta-analysis found that both monotherapy and polytherapy were effective in reducing seizure frequency in patients with epilepsy (13). Similarly, a study reported that there was no significant difference in seizure control between monotherapy and polytherapy (14).

in the current study regarding the impact of mono- and polytherapy on the quality of life of children with epilepsy, there was no statistically significantly differ between the mono and polytherapy groups, including physical activities and health, general mood and feelings, family and free time, friends, school and learning, and the total score. Several studies study found no significant differences between the mono- and polytherapy groups in terms of overall quality of life and various domains of the Pediatric Quality of Life Inventory (PedsQL) (15, 16).

Some studies have explored the correlation between health-related quality of life (HRQoL) and clinical

characteristics in children with epilepsy. A study found a negative correlation between HRQoL scores and seizure frequency in children with epilepsy, which is consistent with the present study's findings that there was no significant correlation between HRQoL and frequency of fits in the monotherapy group (17).

Similarly, a randomized controlled study found that age at onset and duration of epilepsy were not significantly correlated with HRQoL scores in children with epilepsy, which is consistent with the present study's findings that there were no significant correlations between HRQoL scores and age of onset of fits or age of starting treatment in the monotherapy group (18).

Regarding the negative correlation between HRQoL scores and age, weight, and height in the monotherapy group, a study found a negative correlation between HRQoL scores and age in children with epilepsy, which supports the present study's findings (19). However, the present study's finding of a negative correlation between HRQoL scores and weight and height is less commonly reported in the literature and may require further investigation.

The finding of a negative correlation between the KIDSCREEN-27 total score and age, weight, and height in the polytherapy group is consistent with previous research on the impact of antiepileptic drugs on quality of life in

children with epilepsy. A study reported that the use of polytherapy was associated with a lower quality of life in children with epilepsy, compared to monotherapy (20).

Another study found that polytherapy was associated with a higher risk of cognitive impairment and lower quality of life in children with epilepsy, compared to monotherapy (21).

However, it is important to note that there are also studies that have reported no significant impact of polytherapy on quality of life in children with epilepsy. For instance, a study found that there were no significant differences in quality of life between children receiving monotherapy and those receiving polytherapy (14).

However, a study reported that patients on monotherapy had a better QOL as compared to patients receiving polytherapy. (6).

Regarding physical activities and health score and other parameters in both the monotherapy and polytherapy groups. Our findings align with some previous research studies that have also reported a lack of significant correlations between physical activities and health score and other factors in adolescents with epilepsy. A study conducted among a similar population with epilepsy found no significant associations between physical activities and health score and demographic factors like age, gender, and seizure type (22).

Similarly, a study focusing on health-related quality of life in patients with epilepsy reported no significant differences in the physical health domain based on gender and type of seizures (23).

However, our findings differ from other studies that have explored physical activities and health in adolescents with epilepsy. As a study observed that physical activities positively correlated with quality of life in adolescents with epilepsy (24). A study included 30 with epilepsy and 30 without epilepsy and reported that female adolescents with epilepsy engaged in fewer physical activities compared to their male counterparts (25).

Regarding general mood and feelings score and various parameters in both the monotherapy and polytherapy groups. Our findings are consistent with some previous research studies that have also reported a negative correlation between age and the general mood and feelings domain in adolescents with epilepsy. A study was conducted on patients with epilepsy and aged 4 to 16 years and found that older age was associated with decreased emotional well-being and mood. Also, children with epilepsy have a higher rate of psychiatric and behavioural symptoms (26).

Limitation: The sample size of our study was relatively small, which limits the generalizability of the findings to a larger population, the cross-sectional design of our study only allows for

associations between variables to be identified and not causation. Therefore, it is difficult to establish a cause-and-effect relationship between antiepileptic therapy and quality of life, as our study was conducted in only two hospitals, the sample may not be representative of the general population of adolescent patients with epilepsy, and the data collected from the KIDSCREEN-27 questionnaire relies on self-reporting, which may lead to reporting bias or overestimation of the quality of life.

Conclusion

No significant differences in quality of life and social well-being between adolescents with epilepsy receiving mono antiepileptic therapy and those receiving poly antiepileptic therapy. Both treatment groups had comparable scores in the KIDSCREEN-27 domains.

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