

# Adherence of Anti-Epileptic Drugs in Pediatric Age Group in a Tertiary Care Teaching Hospital: A Cross-Sectional Study

Mousumi Das<sup>1\*</sup>, Vijay K. Sehgal<sup>1</sup>, Harjinder Singh<sup>2</sup>

## ABSTRACT

**Objectives:** In this cross-sectional study, the aims were to analyze the adherence of anti-epileptic drugs in pediatric age group. Comparison with age, gender, disease duration, education status of parents, etc., was considered. Non-adherence to epilepsy medications can interfere with treatment and may adversely affect clinical outcomes, although few studies have examined this relationship. **Materials and Methods:** Study was conducted over 200 patients for 6 months in outpatient basis pediatric department in Rajindra Hospital associated with Government Medical College, Patiala, a tertiary care teaching hospital in Punjab. The patient diagnosed by the pediatrician with epilepsy who fulfilling inclusion and exclusion criteria was enrolled after taking informed consent. Adherence was noted using Morisky adherence questionnaire at clinical visit. **Results:** In this study, a total 200 children were enrolled. Our study results showed that majority of the patients had medium (96.48%) medication adherence to prescribed treatment. In high adherence group, most of the patients were graduate (35.48%) followed by primary education (35.29%). In high adherence group, there were more patients present in the age group of  $\leq 5$  years (45.24%). In our study, low and high adherence group was more associated with who have positive family history. **Conclusion:** In the present study, majority of the patients had medium medication adherence to prescribe treatment. In high adherence group, most of the patients were graduate followed by primary education also in this group more patients present in the age group of  $\leq 5$  year who have positive family history.

**Keywords:** Adherence, Antiepileptic drugs, Epilepsy, Pediatric  
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## INTRODUCTION

Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures and by the neurobiological, cognitive, psychological, and social consequences of this condition.<sup>[1]</sup> Epilepsy is one of the most common serious neurological disorders.<sup>[2]</sup> Epilepsy is defined as the sudden, paroxysmal electric discharge from central nervous system resulting in involuntary motor, sensory, and autonomic disturbance with or without alteration in sensorium. Seizures often cause transient impairment of awareness, leaving the individual at risk of bodily harm and often interfering with education and employment.<sup>[3]</sup> People with epilepsy may experience varying degrees of social stigma due to their conditions.

In ancient history, epilepsy was thought to be a spiritual condition. The world's oldest description of epileptic seizures comes from a text in Akkadian (a language used in ancient Mesopotamia) and was written around 2000 BC.<sup>[4]</sup> In the fifth century BC, Hippocrates rejected the idea that the disease was caused by spirits.

About 5–10% of the population will have at least one seizure, with the highest incidence occurring in early childhood and late childhood.<sup>[5]</sup> Using the definition of epilepsy as 2 or more unprovoked seizure, the incidence of epilepsy is 0.3–0.5% in different population throughout. In the world, and the prevalence of epilepsy has been estimated at 5–30 persons per 1000.<sup>[6]</sup> Its incidence is highest during childhood. The median incidence for children aged 0–14 years is 0.822/1000 children. It has also been estimated that 70% of all epilepsy syndrome start between the age of 0 and 19 years and 30% of the children with seizure will have their first episode before the age of 4 years, and more than half of the children with epilepsy will have more than one type of seizure.<sup>[7]</sup> Crude prevalence rate for active epilepsy was 7.44/1000 population in Punjab.

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Non-adherence to epilepsy medications can interfere with treatment and may adversely affect clinical outcomes, although few studies have examined this relationship. Medication non-adherence is considered one of the most serious impediments in current medical practice.<sup>[8,9]</sup> It is well established that non-adherence to antiepileptic drugs (AEDs) may lead to a loss of seizure control.<sup>[10,11]</sup>

Suboptimal adherence levels have been reported with non-adherent patients more likely to have seizures which are associated with increase in number of admissions and healthcare costs.<sup>[12]</sup> Only a few epidemiological studies are available, which have explored the AED safety profile in pediatric patients.<sup>[13]</sup>

The present study will conduct to determine the nature of adherence of AEDs in children with epilepsy in our institute. Epilepsy is a very common disease in our pediatric department so this study will be helpful to analyze the therapeutic benefit in the patient in our institute.

## MATERIALS AND METHODS

### Study Design

This cross-sectional study conducted in outpatient in pediatric department in Rajindra Hospital associated with Government Medical College, Patiala, a tertiary care teaching hospital in Punjab. All epileptic patients who fulfill all inclusion and exclusion criteria will register for the study. Duration of the study is 6 months. The study was approved by the Institutional Ethical Committee, the Government Medical College, Patiala Ethical Committee for Human Research (Approval no. Trg.9[310]2020/2601).

### Sample Size

The sample size was 200 patients.

### Inclusion Criteria

1. Both male and female patients
2. Age group 1 years–12 years
3. Diagnosed as epilepsy patient.

**Table 1:** Response Score Coding by Morisky adherence questionnaire

Sr. No.	Response Score Coding		
1	Do you ever forget to take your medicine?		
2	Are you careless at times about taking your medicine?		
3	When you feel better, do you sometimes stop taking your medicine?		
4	Sometimes if you feel worse when you take the medicine, do you stop taking it?		
Distribution of Score	0	35	17.50%
	1	40	20%
	2	56	28%
	3	38	19%
	4	31	15%
0	Low	35	17.50%
1–2	Moderate	96	48%
3–4	High	69	34.50%

**Table 2:** Age distribution

Age group (years)	Patients	Percentage
≤5 years	42	21
6–10 years	75	37.50
>10 years	83	41.50
Total	200	100
Mean±SD	9.11±3.88	
Median	10.00	
Range	0–17	

SD: Standard deviation

**Table 3:** Comparison of age with adherence to treatment among study population

Domain	Variables	n	Adherence			Chi-square	P-value
			Low (%)	Medium (%)	High (%)		
Age (Years)	≤5 Years	42	8 (19.05)	15 (35.71)	19 (45.24)	116.22	0.012 (S)
	6–10 Years	75	14 (18.67)	37 (49.33)	24 (32)		
	>10 Years	83	13 (15.66)	44 (53.01)	26 (31.33)		
	Total	200	35 (17.50)	96 (48)	69 (34.50)		

S: p value<0.05 (significant)

### Exclusion Criteria

1. Patient with secondary epilepsy due to head injury, cerebral palsy, stroke, metabolic disorder, etc.,
2. Parent not willing to participate in the study,
3. Patients with uncertain diagnosis.

### Study Sequence

In the outpatient department, all patients will be screened according to inclusion and exclusion criteria. All the patient will be informed about the study in their own preferable language (English/Hindi/Punjabi). Written informed consent will be obtained from each patient. All the adverse effects will be recorded in a pre-structured data entry form.

### Data Collection

Patient age, gender, present and past medical history, drug report, type of seizers, the AED prescribed, and adverse drug reactions will be recorded in a pre-structured data entry form.

### Adherence Measurement

In this cross-sectional study, adherence was noted using Morisky adherence questionnaire at clinic visit and any other feedback reported by patients.

### Data Analysis

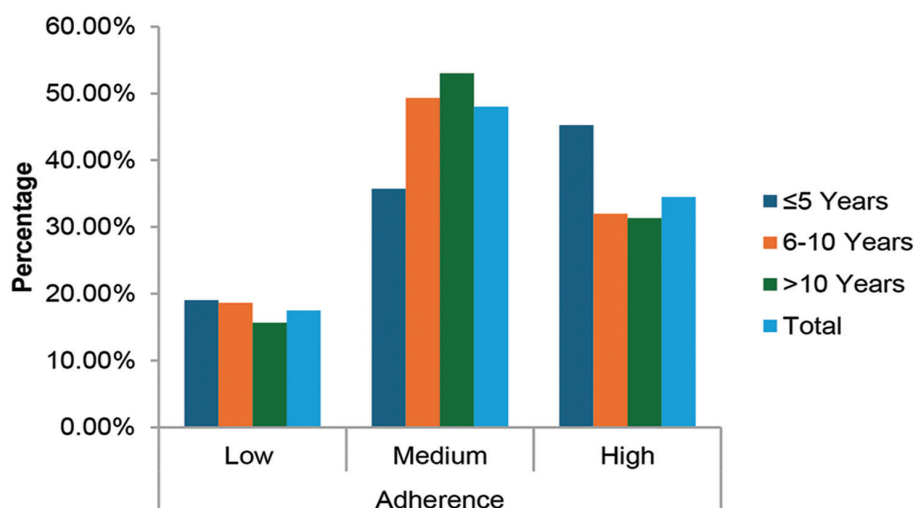
All data will be statistically analyzed using appropriate tests.

## RESULTS

In this cross-sectional study, Morisky adherence questionnaire will be used to evaluate patient adherence to treatment. Where questions were asked to the patient or guardian and answer will be collected as yes or no mode. Where yes means 0 score which is lowest level of medication adherence and no means 1 score. Score 4 will be the highest level of medication adherence. Score 0 is the low level of medication adherence, 1–2 is moderate and 3–4 is the high level of medication adherence. Our study results showed that majority of the patients had moderate in 96 (48%) medication adherence to prescribed treatment, followed by high adherence in 69 (34.50%) and low adherence by 35 (17.50%). Response Score Coding by Morisky adherence presented in table 1.

### Age

In this study, a total of 200 children were enrolled. The mean age was 9.11 ± 3.88, median was 10.00. In ≤5 Years of age group, there was total 42 (21%) children, in 6–10 years age group 75 (37.50%)



children, and >10 years of age group, there was 83 (41.50%). The distribution of epilepsy patients according to age groups is presented in Table 2.

In our study, in high adherence group, there were more patients present in the age group of ≤5 year (19, 45.24%) and in medium adherence group, also there were more patients in the age group of >10 years (44, 53.01%). However, in low adherence group, there were more patients present in the age group of ≤5 years (8, 19.05%). Comparison of age with adherence to treatment among study population was shown in Table 3.

### Gender

Out of total 200 children, 127 (63.50%) patients were male and 73 (36.50%) patients were female. In our study, male were more prone for epilepsy. Distribution of epilepsy patients according to sex is presented in Table 4.

In our study, in high adherence group, there were more patients present in the age group of ≤5 years (19, 45.24%) and in medium adherence group, also there were more patients in the age group of >10 years (44, 53.01%). However, in low adherence group, there were more patients present in the age group of ≤5 years (8, 19.05%). Comparison of age with adherence to treatment among study population is shown in Table 5.

### Duration of Epilepsy

Outpatient of pediatric department in Rajindra hospital, there was found that <1 years duration of disease, there were 32 (16%) patients, 1–2 years, there were 120 (60%), 2.1–3 years, there were 39 (19.50%), and >3 years, there were only 9 (4.50%). The mean duration of epilepsy was  $1.60 \pm 0.88$ , median was 1.55, and range 0–4 years. The highest number of patients was in the duration of 1–2 years and that was total 120 patients (60%). The distribution of duration of disease among epilepsy patients is presented in Table 6.

In low adherence group, most of patients had disease duration of >3 years, that is, 3 (33.33%). In medium and high adherence

**Table 4:** Gender

Gender	Patients	Percentage
Female	73	36.50
Male	127	63.50
Total	200	100

group, most of patients had disease duration of 2.1–3.0 years, that is, 21 (53.85%) and <1 years, that is, 12 (37.50%), respectively. Comparison of disease duration with adherence to treatment in study population is shown in Table 7.

### Family History

In this cross-sectional study, association of family history with the disease also observed. There were 179 (89.50%) patients which had no association with family history whereas 21 (10.50%) patients had positive family history. The distribution of association of family history among epilepsy patients is presented in Table 8.

In our study, low and high adherence had more association with the patients who had positive family history. Whereas medium adherence had more association with the patients who had no positive family history, comparison of adherence with family history to treatment in study population is shown in Table 9.

### Education

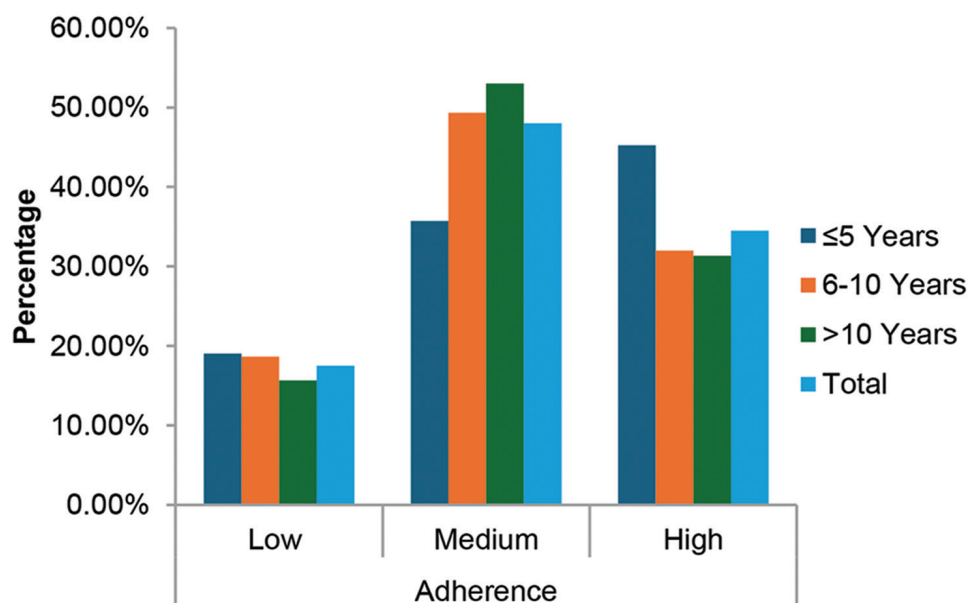
In this cross-sectional study, out of 200 patients, data on the education status of parents also collected. Total 37 (18.50%) were illiterate, 34 (17%) had primary education, 65 (32.50%) had secondary education, 31 (15.50%) were graduate, and 33 (16.50%) were post graduate. Hence, in this study, most of the parents were secondary education. The distribution of education status of parent among epilepsy patients is presented in Table 10.

In present study, in low adherence group, most of the patients had primary education 8 (23.53%) followed by graduate education

**Table 5:** Comparison of Gender with adherence to treatment among study population

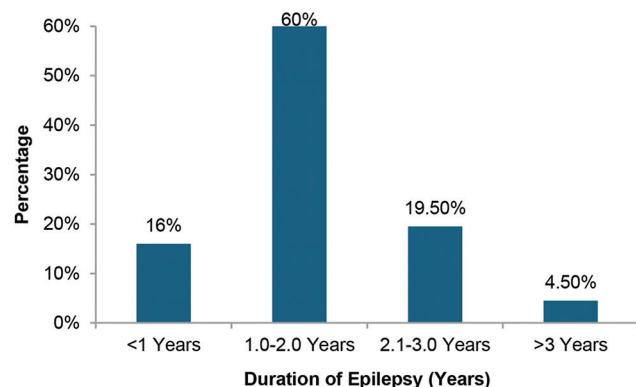
Domain	Variables	n	Adherence			$\chi^2$	P-value
			Low (%)	Medium (%)	High (%)		
Gender	Female	73	12 (16.44%)	32 (43.84%)	29 (39.73%)	26.67	0.015 (S)
	Male	127	23 (18.11%)	64 (50.39%)	40 (31.50%)		
	Total	200	35 (17.50%)	96 (48%)	69 (34.50%)		

S: P value&lt;0.05 (significant)

**Table 6:** Duration of epilepsy

Duration of epilepsy (years)	Patients	Percentage
<1 Years	32	16
1.0–2.0 years	120	60
2.1–3.0 years	39	19.50
>3 years	9	4.50
Total	200	100
Mean±SD		1.60±0.88
Median		1.55
Range		0–4

SD: Standard deviation



7 (22.58%). In medium adherence group, most of the patients were illiterate 21 (56.76%) followed by postgraduate 17 (51.52%). In high adherence group, most of the patients were graduate 11 (35.48%) followed by primary education 13 (35.29%). Comparison of education status of parents with adherence to treatment among study population is shown in Table 11.

## DISCUSSION

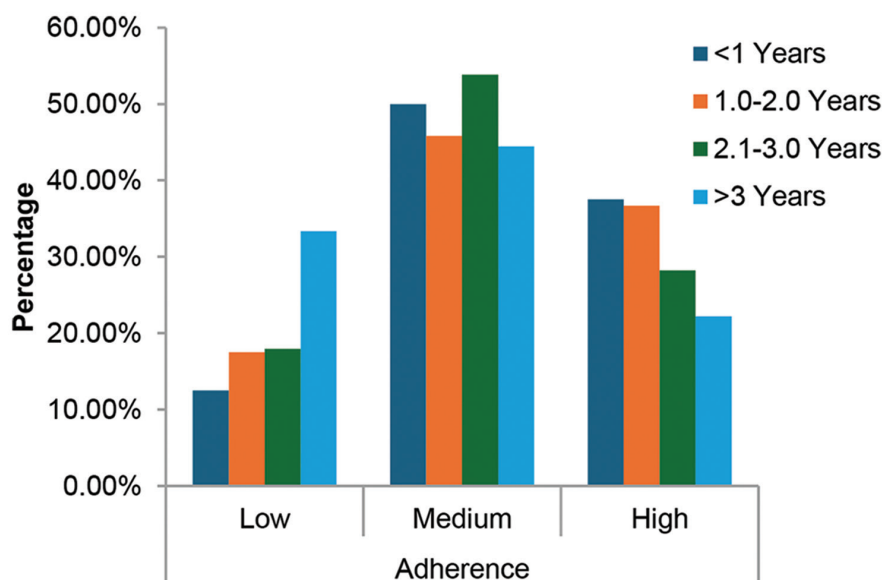
Our study results showed that majority of the patients had moderate 96 (48%) medication adherence to prescribed treatment, followed by high adherence in 69 (34.50%) and low adherence by 35 (17.5%).

Out of total 200 children, 127 (63.50%) patients were male and 73 (36.50%) were female patients. Hence, in our study, male was more prone to the disease than female. The present study is similar with Eswari *et al.*, in their study at Sri Padmavathi School of Pharmacy, Andhra Pradesh, was found that male children were more prone to the seizures than female children.<sup>[14]</sup> Our study is contrast with Das *et al.* done a study at JIPMER, Puducherry, India, which showed that about 52% of the patients were female.<sup>[15]</sup> Furthermore, Halwni *et al.*, at PT JNM Medical college, Raipur, have found that higher percentage of patients were female (59.3%) than male (59.3%) patients.<sup>[16]</sup> It was observed that more males were present low adherence group, that is, 23 (18.11%) and medium adherence group,

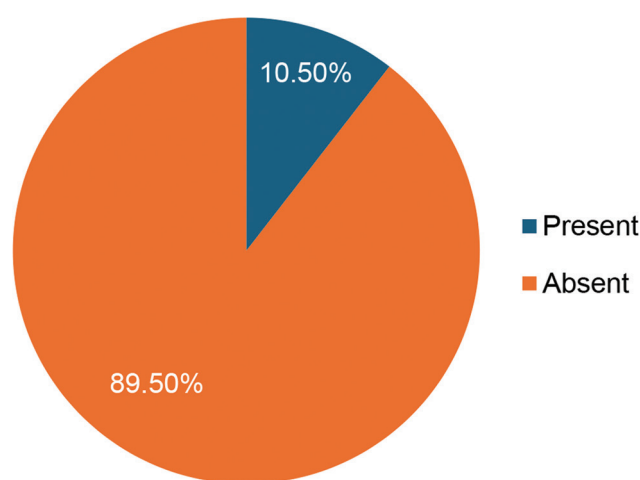
**Table 7:** Comparison of disease duration with adherence to treatment in study population

Domain	Variables	n	Adherence			Chi-square	P-value
			Low (%)	Medium (%)	High (%)		
Disease Duration	<1 Years	32	4 (12.50)	16 (50)	12 (37.50)	37.08	0.036 (S)
	1.0–2.0 Years	120	21 (17.50)	55 (45.83)	44 (36.67)		
	2.1–3.0 Years	39	7 (17.95)	21 (53.85)	11 (28.21)		
	>3 Years	9	3 (33.33)	4 (44.44)	2 (22.22)		
	Total	200	35 (17.50)	96 (48)	69 (34.50)		

S: p value&lt;0.05 (significant)

**Table 8:** Family history

Family history	Patients	Percentage
Present	21	10.50
Absent	179	89.50
Total	200	100



that is, 64 (50.39%). However, in high adherence group, more females were present 29 (39.73%).

In  $\leq 5$  years of age group, there was total 42 (21%) children, in 6–10 years age group, 75 (37.50%) children, and  $>10$  years of age group, there was 83 (41.50%). Hence, majority of patients in  $>10$  years of age group. However, in contrast, Hara *et al.* have found an increased incidence in 0–4 years as compared to 5–9 years.<sup>[7]</sup> Furthermore, Halwni *et al.* have found regarding age-wise distribution, the children between 1 and 4 years of age were admitted with the complaint of seizures.<sup>[16]</sup> In our study, in high adherence group, there were more patients present in the age group of  $\leq 5$  years (19, 45.24%), and in medium adherence group, also there were more patients in the age group of  $>10$  years (44, 53.01%). However, in low adherence group, there were more patients present in the age group of  $\leq 5$  years (8, 19.05%). Furthermore, Gabriel-Job and Wobo were found that children  $<5$  years in this study were more adherent to their AEDs compared to the older ones.<sup>[17]</sup>

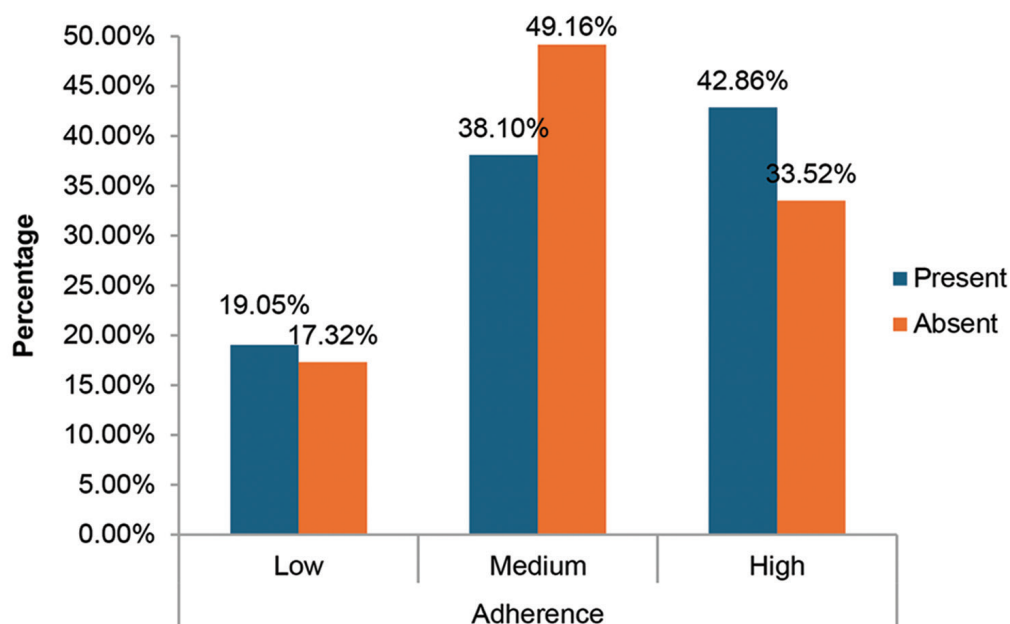
Outpatient of pediatric department in Rajindra hospital, there was found that  $<1$  years duration of disease, there were 32 (16%) patients, 1–2 years, there were 120 (60%), 2.1–3 years, there were 39 (19.50%), and  $>3$  years, there were only 9 (4.50%). The mean duration of epilepsy was  $1.60 \pm 0.88$ , median was 1.55, and range 0–4 years. Hence, the highest number of patients was in the duration of 1–2 years and that was about 120 patients (60%). Qoul *et al.*, in their study, found that the mean and standard deviation of the duration of the disease for patients was 3.5 years and 2.3 years, respectively.<sup>[18]</sup> In low adherence group, most of patients had



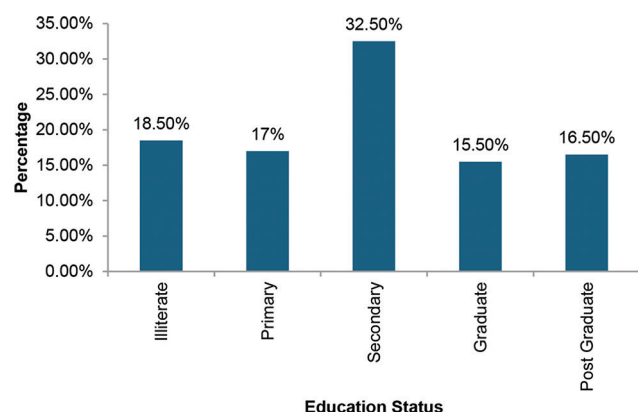
**Table 9:** Comparison of with family history adherence to treatment in study population

Domain	Variables	n	Adherence			Chi-square	P-value
			Low (%)	Medium (%)	High (%)		
Family History	Present	21	4 (19.05)	8 (38.10)	9 (42.86)	1.19	0.880 (NS)
	Absent	179	31 (17.32)	88 (49.16)	60 (33.52)		
	Total	200	35 (17.50)	96 (48)	69 (34.50)		

NS: Not significant

**Table 10:** Education status

Education status	Patients	Percentage
Illiterate	37	18.50
Primary	34	17
Secondary	65	32.50
Graduate	31	15.50
Postgraduate	33	16.50
Total	200	100



disease duration of >3 years, that is, 3 (33.33%). In medium and high adherence group, most of patients had disease duration of

2.1–3.0 years, that is, 21 (53.85%) and <1 years, that is, 12 (37.50%), respectively.

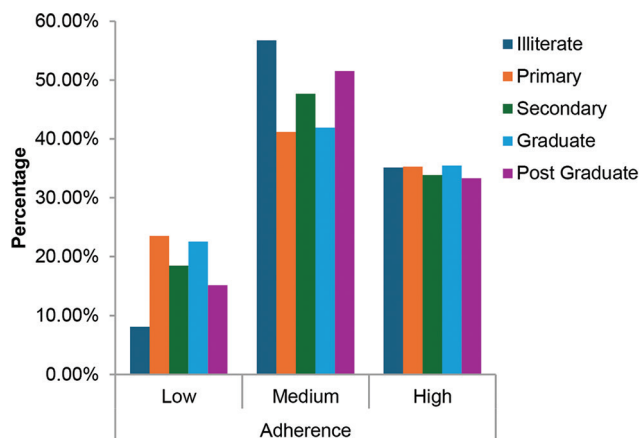
There were 179 (89.50%) patients had no association with family history whereas 21 (10.50%) patients had positive family history. Hence, in present study, a greater number of patients had no family history. The present study is similar with Das *et al.* in their study was found among the 100 patients; only 26 had the family history of epilepsy.<sup>[15]</sup> Furthermore, Gabriel-Job N *et al.*, in their study, mentioned a considerably a smaller number of patients (16.4%) which exhibited family history of seizure disorder.<sup>[17]</sup> In our study, low and high adherence had more association with the patients who had positive family history. However, medium adherence had more association with the patients who had no positive family history.

In this cross-sectional study, out of 200 patients, data on the education status of parents also collected. Total 37 (18.50%) were illiterate, 34 (17%) had primary education, 65 (32.50%) had secondary education, 31 (15.50%) were graduate, and 33 (16.50%) were postgraduate. Hence, in this study, most of the parents were secondary education. In the present study, in low adherence group, most of the patients had primary education 8 (23.53%) followed by graduate education 7 (22.58%). In medium adherence group, most of the patients were illiterate 21 (56.76%) followed by postgraduate 17 (51.52%). In high adherence group, most of the patients were graduate 11 (35.48%) followed by primary education 13 (35.29%).

**Table 11:** Comparison of education status of parents with adherence to treatment among study population

Domain	Variables	n	Adherence			Chi-square	P-value
			Low (%)	Medium (%)	High (%)		
Education Status	Illiterate	37	3 (8.11)	21 (56.76)	13 (35.14)	16.68	0.007 (S)
	Primary	34	8 (23.53)	14 (41.18)	12 (35.29)		
	Secondary	65	12 (18.46)	31 (47.69)	22 (33.85)		
	Graduate	31	7 (22.58)	13 (41.94)	11 (35.48)		
	Postgraduate	33	5 (15.15)	17 (51.52)	11 (33.33)		
	Total	200	35 (17.50)	96 (48)	69 (34.50)		

S: p value&lt;0.05 (significant)



## SUMMARY AND CONCLUSION

In this study, a total of 200 children were enrolled. Our study results showed that majority of the patients had moderate 96 (48%) medication adherence to prescribed treatment, followed by high adherence in 69 (34.50%) and low adherence by 35 (17.5%). In our study, in high adherence group, there were more patients present in the age group of  $\leq 5$  years (19, 45.24%) and in medium adherence group, also there were more patients in the age group of  $> 10$  years (44, 53.01%). However, in low adherence group, there were more patients present in the age group of  $\leq 5$  years (8, 19.05%). It was observed that more male were present low adherence group, that is, 23 (18.11%) and more males were present in medium adherence group, that is, 64 (50.39%). However, in high adherence group, more female were present 29 (39.73%). In the present study, in low adherence group, most of the patients had primary education 8 (23.53%) followed by graduate education 7 (22.58%). In medium adherence group, most of the patients were illiterate 21 (56.76%) followed by postgraduate 17 (51.52%). In high adherence group, most of the patients were graduate 11 (35.48%) followed by primary education 13 (35.29%). In low adherence group, most of patients had disease duration of  $> 3$  years, that is, 3 (33.33%). In medium and high adherence group, most of patients had disease duration of 2.1–3.0 years, that is, 21 (53.85%) and  $< 1$  years i.e. 12 (37.50%), respectively, in our study, low and high adherence had more association with the patients who had positive family history. However, medium adherence had more association with the patients who had no positive family history. It was concluded that adherence pattern in this study is relevant with current trend.

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## AUTHORS CONTRIBUTIONS

All authors revise it critically for important intellectual content. All authors approved the final version.

## CONFLICTS OF INTEREST

No potential conflicts of interest were disclosed.

## AUTHORS FUNDING

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