



## Integration of childhood epilepsy into Primary Health Center to Improve Antiepilepsy Drugs (AEDs) Adherence in Resource-Constrained District of Pakistan

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### Abstract:

**Introduction:** There is a dearth of data on effectiveness-assessment of community interventions regarding the adherence improvement among children with epilepsy (CWE) in outreach financially-poor settings. This study was therefore designed to determine the impact of integration of childhood epilepsy into primary care to improve the level of adherence to antiepileptic drugs and the factors that are associated with nonadherence.

**Objectives:** This study was designed to determine the effectiveness of interventions through free community childhood epilepsy center aimed at improving adherence to antiepileptic medication in CWE in an outreach financially constrained district.

**Methods:** During this interventional study, 240 children (160 children being treated and followed in the free community primary care childhood epilepsy center and 80 children not being treated at this center) aged 4 months to 18years, diagnosed with epilepsy and treatment initiated with at least 1 AED for the past 3 months, were selected for data collection. The childhood epilepsy camps were held at local community centers provided open access, and no user fees or charges for medication were made. Local physicians, who were provided with special training and visiting pediatric neurology fellows carried out screening to help the three visiting pediatric neurologists confirming the diagnoses for data collection. Data was collected by a questionnaire divided into three parts: 1) demographical information about patients 2) information about medication adherence profile using the Morisky Medication Adherence Scale-8 (MMAS-8), and 3) data on intervention-effectiveness of the community childhood epilepsy center (CCEC) on antiepileptic drug adherence. Ethical approval was obtained from the institutional ethics committee.

**Results:** Among the 240 children and adolescents with epilepsy who fulfilled the inclusion criteria, 160 (66.6%) reported seeking treatment from TDBUCEC and 80 (33.4%) were seeking AED(s) from other

sources. The age range was 04 months - 18 years while the male to female ratio was 1.26:1. Adherence to antiepileptic drugs by self-report was found to be 85% (was 42% in 2014 without community intervention) among the children being treated, provided free AEDs with consultations and followed at the epilepsy center, whereas adherence was 37.5% among the children not being intervened by this center. There was no statistical difference in age and gender among these two groups.

**Conclusion:** Majority of children had good adherence levels when supported and given free treatment in their own community. The best intervention strategy to improve adherence to antiepileptic medication among CWE is integration and implementation of childhood epilepsy in primary health care to provide free uninterrupted anti-epilepsy drugs (AEDs) and pediatric epilepsy consultations in outreach resource-constrained districts in Pakistan.

### Keywords

Anti-Epilepsy Drugs (AEDs), Epilepsy, Sustainability, Morisky Medication Adherence Scale, Developing Countries, Treatment

### Introduction

In developing countries with resource-poor communities, approximately 60% of **children with epilepsy** (CWE) demonstrate nonadherence to treatment [1,2]. In outreach financially- constrained district Bhakkar in Pakistan, nonadherence to AEDs was documented in 58% among CWE in 2014 [3]. Improving pediatric adherence to treatment is especially important as there is evidence that complying with treatment improves the health outcomes of children more than that of adults [4]. Studies have investigated a range of interventions, but improving compliance in chronic conditions such as childhood epilepsy is a complex task [5]. Some specific interventions to improve adherence to anti-epilepsy medications have been evaluated but mixed interventions showed improved adherence in the intervention groups as compared to the control groups, however, we need more reliable evidence on their efficacy from carefully designed randomized controlled trials before a firm conclusion can be reached [6]. No interventional strategy associated with improvement to AEDs adherence among CWE has been evaluated in Pakistan. Thus, the present study aimed to evaluate the effectiveness of childhood epilepsy integrated into primary health care in outreach resource-constrained district and providing a free regular, uninterrupted supply of AEDs, monthly childhood epilepsy consultation, and interventional camps to improve AEDs adherence among CWE.

### Methods

#### *Study design:*

A community-based cross-section study was conducted in free clinical pediatric neurology camps at two community centers in different areas of Bhakkar city on 7<sup>th</sup> and 8<sup>th</sup> December 2018.

#### *Participants and Procedures:*

The study was done in two public community centers to avoid the biasness of better treatment at the Centre. Participants were recruited from the two free pediatric neurology camps in Bhakkar city. Children were eligible to participate if they: (1) received an epilepsy diagnosis and were prescribed at least one AED, (2) had no comorbid medical conditions requiring a daily medication, (3) had no significant developmental disorders reported by their caregiver, and (4) the family was fluent in Saraiki (local language). Children aged 04 months to 18 years of age, diagnosed with epilepsy and treatment initiated with at least 1 AED for the past 3 months were eligible to participate. Data collection was done using a questionnaire which was divided into three parts; 1) demographical information about patients and their caregivers along with clinical details of epilepsy; 2) information about medication adherence profile with the help of the **Morisky Medication Adherence Scale-8** (MMAS-8) [7]; and 3) evaluation of interventional effectiveness in AED(s) adherence improvement by integrating childhood epilepsy into primary health care. Data were collected by

interviewing participants and reviewing patient charts using structured and pre-tested questionnaire by trained data collectors. AEDs nonadherence was measured by an eight-item Morisky Medication Adherence Scale (MMAS-8) [7]. A modified MMAS-8 item was developed from the original MMAS-8 during 2008 by Morisky and his colleagues, was translated into English and Saraiki (local language). The first seven items are dichotomous response categories with yes or no and the last item is five-point Likert scale response [7].

#### Ethical Issues:

Ethical approval for the study was obtained from the Ethical Committee of the Brain Associates, Lahore. Verbal consent was obtained from the household heads and adolescent patients and from parents or close family relatives of children. Confidentiality was maintained by anonymous questionnaire and informed consent was obtained from each participant.

#### Results

##### Patient Characteristics and Factors associated with AEDs-Nonadherence:

Among the 240 children and adolescents with epilepsy who were interviewed, 160 (66.6%) reported seeking treatment from Top-Down-Bottom-Up-Childhood-Epilepsy-Program-Center (TDBUCEPC) and

80 (33.4%) were diagnosed from different sources including faith healers, physicians, and government health facilities. The average survey duration for each patient was 15 to 20 minutes, and this analysis was of adherence/non-adherence to AEDs and factors associated with promoting drug adherence. The age range of the patients was 4 months to 18 years (mean:  $10 \pm 3.4$  years). There was a male preponderance (134, 58%) with a male: female ratio of 1.26:1. Of the total 240 patients, 82(34%), were non-adherent and 158(66%) were adherent to the prescribed AEDs for different reasons. Among the 160 CWE commenced AED(s) and being followed at TDBUCEPC, 136(85%) were adherent, while 24(15%) were non-adherent to the prescribed drugs. While among the 80 CWE not being treated and followed at the center, 50(62.5%) were non-adherent and only 30(37.5%) were adherent to the prescribed AED(s). Additional patient demographic information is presented in **Table-1**.

##### Factors associated with adherence/nonadherence to AEDs:

Factors that were found to be significantly associated with medication adherence in the univariate analysis are costs of AEDs, no response to AEDs, counseling by local faith healers, side-effects of AEDs, Poor/no counseling by the treating physician(s) and non-availability of AED(s). Among the 50 nonadherent CWE not being treated and

**Table 1: Distribution of epileptic children with nonadherence to AEDs by age & gender in Bhakhar-Pakistan (N=240)**

Epileptic Patients Following at Top-Down-Bottom-Up Center (n=160, 100%)					Epileptic Patients Not Following at Top-Down-Bottom-Up Center (N=80,100%)			
Age	Male	Female	Total (%)	Nonad (%)	Nonad.(%)	Total (%)	Female	Male
4 Mon - 2 yrs	18	15	33(20.65%)	06(3.50%)	10(12.5%)	16(20%)	6	10
>2 yrs - 5 yrs	22	10	32(20%)	04(2.50%)	12(15%)	18(22.5%)	8	10
>5 yrs - 10 yrs	34	24	58(36.25%)	08(5%)	16(20%)	26(32.5%)	12	14
>10 yrs - 15 yrs	10	15	25(15.6%)	04(2.50%)	10(12.5%)	14(17.5%)	4	10
>15 yrs - 18 yrs	4	8	12(7.5%)	02(2.50%)	02(2.5%)	06(7.5%)	4	2
<b>Total:</b>								
160(100%)	88(55%)	72(45%)	160(100%)	24(15%)	50(62.5%)	80(100%)	34(42.5%)	46(57.5%)

followed at TDBUCEPC, 28(56%) reported the cost of their treatment causing nonadherence to their prescribed AEDs, whereas only 4 (12.5%) CWE being treated at TDBUCEPC reported this cause of their nonadherence. Uncontrolled seizures were associated with 31.5% of the patients being followed at the center as compared with 12% non-adherent patients among not being followed at the center. Misleading and false counseling of local faith healers was

significantly associated with nonadherence, more prevalence among the CWE being followed at free childhood epilepsy center (25%), as compared with those affording their own treatment (12.5%). Additional significant factors Associated with AEDs-adherence/nonadherence are shown in **Table-2**.

### Discussion

Our study provides important information on the

**Table-2: Reasons for nonadherence to AEDS(s) among children with epilepsy in Bhakhar- Pakistan (N=74).**

Patients Non-adherent to AED(s) Following at Top-Down-Bottom-Up Center (n=24,100%)				Patients Non-adherent to AED(s) Not Following at Top-Down-Bottom-Up Center (n=50,100%)	
No	Reasons for non-adherence to AED(s)	No	Percentage	Percentage	No
1	Cost of AED(s)	2	8.3	56	28
2	No response to AED(s)	8	33.3	12	6
3	Counseling by local faith healers	6	25	12	6
4	Side -effects of AEDs	4	16.8		2
5	Poor/no counseling by the treating physician(s)	2	8.3	10	5
6	Non availability of AED(s)	2	8.3	10	3
<b>Total</b>		24	100	100	50

main causes of non-adherence to antiepileptic drugs in poor communities. Firstly, we found that adherence to treatment is not influenced by gender, age, and duration of treatment. This is consistent with the results from the previous studies [8]. The rate of nonadherence is estimated to be between 30-80% of patients depending on the patient population being analyzed [9]. In agreement, we documented AED(s) non-adherence among 58% of the children being treated in 2014, but without any interventional local community childhood epilepsy services [3]. Most of the barriers were effectively removed by provision of free AED(s) and pediatric neurology consultations. We did this by integration and implementation of childhood epilepsy services into primary health care: Rukhsana Shafqat Memorial Primary Health care Center. The integration of CE into this private primary care was done by mutual consent of the owners of the center and visiting TDBUCEP team

from Lahore. We documented that the cohort of CWE, being followed at this community center was adherent 80% to AEDs, as compared to the 47.5% of the cohort not being followed at the center. The Epilepsy Centre receives no government funding and is largely funded from private sources, mainly philanthropic donations, and charity. Similarly Tang et al. documented that with community involvement, the number of patients with epilepsy who missed AEDs decreased to 45.0% from 64.3% [10]. Other previous randomized intervention trials demonstrated that there was no consensus about enhancing compliance through various measures [11]. However, others showed that patient reminders such as reminders mailed together with a counseling leaflet have produced promising effects on adherence. In comparison, our simple package of intervention techniques including free monthly camps for CWE, education, reminders, provision of free AEDs and CE consultations proved to be effective in enhancing AED

adherence. Similar to other studies, patients may have overestimated their adherence in their self-reported data in our cohort being managed at TDBUCEPC Bhakhar [12].

We found that our current cohort of CWE who were not being followed at TDBUCEPC and were affording all the expenses associated with epilepsy treatment from their own pocket still had AEDs nonadherence in 62.5%, which was documented 58%[3] in the same settings in 2014 by self-reported adherence among CWE: children with epilepsy whose parents were buying AEDs were about 4 times more likely as to be non-adherent as compared with those who were getting their AEDs free of charge from TDBUCEPC Bhakkar. Among the non-adherent CWE in this cohort, 28(56%) were so due to purely/predominantly financial reasons. This is exactly what has been reported by Faris et al. and Snodgrass et al., respectively [13,14]. The cost of drugs limits caregivers from purchasing them in case they are not available free or at a very low cost. Similarly Nazziwa et al. reported that the commonest reason given for missing drugs was lack of drugs due to their high cost as reported by 36(48.7%) of study participants comprising of children and adolescents [15]. Similar findings have been reported from various parts of the world with limited resources, allocated for epilepsy care [16]. Thus, the treatment of childhood epilepsy in outreach districts in developing countries, like Pakistan, remains far from satisfactory, mainly because of the non-availability of medications [17,18].

Although it is widely accepted that nonadherence leads to poor seizure control, our findings also suggest that uncontrolled seizures may, paradoxically, contribute to nonadherence. As 10(31.5%) of the non-adherent patient in our study group discontinue the drugs because there was inadequate seizure control, even in 12% of the cohort not being followed at the community center. In agreement, Jones et al. [19] reported a strong correlation between poor seizure control and non-adherence with 63% of those with poorly-controlled epilepsy being non-adherent as compared to 38% of the well-controlled group.

When most of the barriers are removed, misguidance by local health healers was the predominant cause of non-adherence among 8(25%) of the CWE being followed in TDBUCEPC as compared to 6(12%) of the cohort not being followed at the center. This is similar to the worldwide believe that supernatural powers and spirits influence human being and affect their wellbeing and health especially in epilepsy [20]. Though the no of non-adherent CWE cohort being followed at the center was small, about 08.3% of these prescribed AED(s) were not available at the center pharmacy, where these findings were prevalent among 10% of the cohort not following at this center, so both these cohorts were non-adherent to their prescribed medication. We found that in 08.3% of the patients being followed at the center and 10% not following at the center, the major contributing factor was poor or no counseling by the treating physician.

All this indicates that Epilepsy care should be multidisciplinary and long term, linking primary and secondary care, and empowering patients towards improved management of their condition. Such programs have been successful in improving the diagnosis and management of adults with epilepsy in communities of India, Zimbabwe and Ethiopia [21,22].

## Conclusion

Childhood epilepsy is particularly under-resourced and under-treated in the developing countries. Large numbers of people are at risk of morbidity and mortality, mainly because of difficulties with treatment infrastructure, availability of suitable drugs and their cost. The education of health workers, patients, and the wider community is extremely important in outreach financially-constrained societies. Tackling CE in an integrated primary care programme would form a systematic approach with an increased chance of sustainability in the improvement of AED(s) adherence. We have documented that integration and complementation of childhood epilepsy services into community primary health care along with the provision of free consultations and AEDs in outreach poor

communities could play a major role and need to be strengthened. A Vision for Change acknowledges the need for funding to support increased community-based care generally and for specific at-risk group likely children with epilepsy.

## References

- [1] Modi AC, Rausch JR, Glauser TA, "Patterns of non-adherence to antiepileptic drug therapy in children with newly diagnosed epilepsy". *JAMA*, vol.305, no.16: 1669-76, 2011.
- [2] Modi AC, Wu YP, Rausch JR, et al., "Antiepileptic drug nonadherence predicts pediatric epilepsy seizure outcomes". *Neurology*, vol.83, no.22: 2085-90, 2014.
- [3] Malik MA, Shabbir N, Saeed M, et al., "Medication Nonadherence in Children with Epilepsy Attending Outpatient Clinics in Under-Resourced Community". *J Pediatr Epilepsy*, vol.4, no.2: 72-79, 2015.
- [4] Dimatteo MR, "The role of effective communication with children and their families in fostering adherence to pediatric regimens". *Patient Educ Couns*, vol.55, no.3: 339-44, 2004.
- [5] Haynes RB, Ackloo E, Sahota N, et al., "Interventions for enhancing medication adherence". *Cochrane Database Syst Rev*, no.2: CD000011, 2008.
- [6] Dhikale T.P, Muruganandham R, Dongre AR, "Perceptions of the community about epilepsy in rural Tamil Nadu, India". *International Journal of Medical Science and Public Health*, vol.6, no.3: 628-33, 2017.
- [7] Morisky DE, Ang A, Krousel-Wood M, et al., "Predictive validity of a medication adherence measure in an outpatient setting". *J Clin Hypertens (Greenwich)*, vol.10, no.5: 348-54, 2008.
- [8] Gurusurthy R, Chanda K, Sarma GRK, "An evaluation of factors affecting adherence to antiepileptic drugs in patients with epilepsy: a cross-sectional study". *Singapore Med J*, vol.58, no.2: 98-102, 2017.
- [9] Modi AC, Guilfoyle S, "Adherence to Antiepileptic Drug Therapy Across the Developmental Life-span". In: *Society, Behaviour and Epilepsy*, Nova Science Publishers, Inc: 175-205, 2011.
- [10] Tang F, Zhu G, Jiao Z, et al., "The effects of medication education and behavioral intervention on Chinese patients with epilepsy". *Epilepsy Behav*, vol.37: 157-64, 2014.
- [11] DiIorio C, Reisinger EL, Yeager KA, et al., "A telephone-based self-management program for people with epilepsy". *Epilepsy Behav*, vol.14, no.1: 232-36, 2009.
- [12] Simoni JM, Huh D, Wang Y, et al., "The Validity of Self-Reported Medication Adherence as an Outcome in Clinical Trials of Adherence-Promotion Interventions: Findings from the MACH14 Study". *AIDS Behav*, vol.18, no.12: 2285-90, 2014.
- [13] Al-Faris EA, Abdulghan MH, Mahdi AH, et al., "Compliance with appointments and medications in a pediatric neurology clinic at a University Hospital in Riyadh, Saudi Arabia". *Saudi Med J*, vol.23, no.8: 969-74, 2002.
- [14] Snodgrass SR, Vedanarayanan VV, Parker CC, et al., "Pediatric patients with undetectable anticonvulsant blood levels: comparison with compliant patients". *J Child Neurol*, vol.16, no.3: 164-68, 2001.
- [15] Nazziwa R, Mwesige AK, Obua C, et al., "Adherence to antiepileptic drugs among children attending a tertiary health unit in a low resource setting". *Pan Afr Med J*, vol.17: 44, 2014.
- [16] WHO, "Epilepsy: A Manual for Physicians". Geneva-World Health Organization: 2004.
- [17] Meinardi H, Scott RA, Reis R, et al., "The treatment gap in epilepsy: the current situation and ways forward". *Epilepsia*, vol.42, no.1: 136-49, 2001.
- [18] Scott RA, Lhatoo SD, Sander JW, "The treatment of epilepsy in developing countries: where do we go from here?". *Bull World Health Organ*, vol.79, no.4: 344-51, 2001.
- [19] Jones RM, Butler JA, Thomas VA, et al., "Adherence to treatment in patients with epilepsy: associations between seizure control and illness beliefs". *Seizure*, vol.15, no.7: 504-08, 2006.
- [20] Atadzhanov M, Haworth A, Chomba EN, et al., "Epilepsy-associated stigma in Zambia: what factors predict greater felt stigma in a highly stigmatized population?". *Epilepsy Behav*, vol.19, no.3: 414-18, 2010.
- [21] Gourie-Devi M, Satishchandra P, Gururaj G, "Epilepsy control program in India: a district model". *Epilepsia*, vol.44, Suppl-1: 58-62, 2003.
- [22] Berhanu S, Alemu S, Prevett M, et al., "Primary care treatment of epilepsy in rural Ethiopia: causes of default from follow-up". *Seizure*, vol.18, no.2: 100-3, 2009.

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