IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 25, Issue 2 Ser. 1 (February. 2026), PP 69-77
www.iosrjournals.org

A Study of Seizure Control, Antiepileptic Drug Use, and Pregnancy Outcome in Women with Epilepsy

Shravya Satish[1], Sheela S. R[2], Meghana Sai[1], Radhika Shekar[1]*
[1] *Department of Obstetrics and Gynaecology, Sri Devaraj Urs Medical College, Tamaka, Kolar – 563101, Karnataka, India*
[2] *Professor, Department of Obstetrics and Gynaecology, Sri Devaraj Urs Medical College, Tamaka, Kolar – 563101, Karnataka, India*
Corresponding Author: Dr. Sheela S. R.
Professor, Department of Obstetrics and Gynaecology
Sri Devaraj Urs Medical College, Tamaka, Kolar – 563101, Karnataka, India

Abstract
Background: *Epilepsy during pregnancy presents unique clinical challenges requiring careful management of antiepileptic drugs (AEDs) to balance seizure control with fetal safety. The relationship between seizure frequency, AED utilization patterns, and maternal-fetal outcomes remains an area of ongoing investigation, particularly in developing countries where access to newer AEDs and specialized care may be limited.*
Methods: *This prospective observational study was conducted at a tertiary care center from June 2024 to December 2025. A total of 100 pregnant women with epilepsy were enrolled and followed throughout pregnancy until delivery. Data regarding seizure type, frequency, AED regimens, seizure control status, and pregnancy outcomes including mode of delivery, maternal complications, and neonatal outcomes were systematically recorded. Statistical analysis was performed using chi-square tests, Fisher's exact tests, and logistic regression with significance set at $p<0.05$.*
Results: *The mean age of participants was 26.4±4.2 years. Generalized epilepsy was present in 58% and focal epilepsy in 42% of cases. Monotherapy was utilized in 72% of patients, with levetiracetam (38%) and lamotrigine (28%) being the most commonly prescribed AEDs. Seizure freedom during pregnancy was achieved in 68% of women. Pregnancy complications occurred in 24% of cases, including preeclampsia (8%), gestational diabetes (6%), and preterm labor (10%). Congenital malformations were observed in 4% of neonates. Polytherapy was significantly associated with higher rates of congenital anomalies ($p=0.023$) and lower rates of seizure freedom ($p=0.018$).*
Conclusion: *Monotherapy with newer AEDs, particularly levetiracetam and lamotrigine, was associated with favorable seizure control and pregnancy outcomes. Comprehensive preconception counseling, judicious AED selection, and multidisciplinary care remain essential for optimizing outcomes in pregnant women with epilepsy.*
Keywords: *Epilepsy; Pregnancy; Antiepileptic drugs; Seizure control; Congenital malformations; Maternal outcomes*

I. INTRODUCTION

Epilepsy represents one of the most prevalent neurological disorders worldwide, affecting approximately 50 million people globally, with a significant proportion being women of reproductive age [1]. According to recent Global Burden of Disease estimates, the age-standardized prevalence of epilepsy stands at approximately 658 per 100,000 population, with rising trends observed over the past three decades [2]. The management of epilepsy in women who are pregnant or planning conception presents unique therapeutic challenges that necessitate careful consideration of both maternal seizure control and fetal wellbeing.

Pregnancy in women with epilepsy has historically been associated with concerns regarding increased seizure frequency, obstetric complications, and teratogenic effects of antiepileptic drugs (AEDs). The physiological changes during pregnancy, including increased plasma volume, enhanced renal clearance, and alterations in hepatic metabolism, can significantly impact the pharmacokinetics of AEDs, potentially leading to subtherapeutic drug concentrations and breakthrough seizures [3]. Previous studies have reported variable rates of seizure worsening during pregnancy, ranging from 14% to 62%, though recent evidence from the Maternal Outcomes and Neurodevelopmental Effects of Antiepileptic Drugs (MONEAD) study suggests that with appropriate monitoring and dose adjustments, seizure frequency during pregnancy may not differ significantly from non-pregnant controls [4].

The teratogenic potential of AEDs remains a paramount concern in the management of epilepsy during pregnancy. Data from international pregnancy registries, including the European Registry of Antiepileptic Drugs and Pregnancy (EURAP), have provided valuable insights into the comparative risks of major congenital

malformations (MCMs) associated with different AEDs [5]. Valproate has been consistently identified as carrying the highest teratogenic risk, with prevalence of MCMs ranging from 10.3% at lower doses to 25.2% at doses exceeding 1450 mg/day. In contrast, newer AEDs such as lamotrigine and levetiracetam have demonstrated favorable safety profiles, with MCM rates of 2.9% and 2.8%, respectively, which fall within the range observed in the general unexposed population [6].

Beyond structural malformations, there is growing recognition of the potential neurodevelopmental effects of prenatal AED exposure. The Neurodevelopmental Effects of Antiepileptic Drugs (NEAD) study demonstrated that children exposed to valproate in utero exhibited lower cognitive scores and increased risk of autism spectrum disorder compared to those exposed to other AEDs [7]. These findings have prompted significant changes in prescribing practices, with a notable shift toward newer generation AEDs in women of childbearing potential. Current evidence suggests that lamotrigine and levetiracetam are associated with minimal risk of adverse neurodevelopmental outcomes, making them preferred choices for women who require AED therapy during pregnancy [8].

The role of folic acid supplementation in women with epilepsy has been the subject of considerable investigation. While folic acid supplementation is universally recommended for all pregnant women to reduce the risk of neural tube defects, its specific benefits in women taking AEDs remain incompletely characterized. Some AEDs, particularly enzyme-inducing agents, can lower serum folate levels, providing a rationale for supplementation [9]. Recent evidence from the MONEAD study and other cohorts suggests that periconceptional folic acid use may be associated with improved neurodevelopmental outcomes in children exposed to AEDs in utero, though the optimal dosage remains debated.

In India, where a substantial proportion of pregnancies remain unplanned and access to specialized epilepsy care may be limited, the management of epilepsy during pregnancy presents additional challenges. Data from the Kerala Registry of Epilepsy and Pregnancy (KREP) have documented significant temporal trends in AED prescribing patterns and outcomes over two decades, demonstrating improvements in folic acid utilization and declining seizure rates during pregnancy [10]. However, comprehensive data on seizure control, AED utilization patterns, and pregnancy outcomes from tertiary care centers in India remain limited.

The present study was undertaken to evaluate seizure control, patterns of antiepileptic drug use, and pregnancy outcomes in women with epilepsy attending a tertiary care center. The findings of this study are intended to contribute to the growing body of evidence guiding the management of epilepsy during pregnancy in resource-limited settings and to inform clinical decision-making regarding optimal AED selection and monitoring strategies.

II. AIMS AND OBJECTIVES

The primary aim of this study was to comprehensively evaluate seizure control, antiepileptic drug utilization patterns, and pregnancy outcomes in women with epilepsy at a tertiary care center in India. The study sought to determine the proportion of women achieving seizure freedom during pregnancy and to identify clinical and treatment-related factors associated with seizure control status.

The study further aimed to characterize the current patterns of antiepileptic drug prescription in pregnant women with epilepsy, including the frequency of monotherapy versus polytherapy, the specific agents utilized, and any modifications made to AED regimens during the course of pregnancy. An additional objective was to document the prevalence and nature of maternal complications, including obstetric adverse events such as preeclampsia, gestational diabetes mellitus, antepartum hemorrhage, and preterm labor.

Assessment of neonatal outcomes constituted another key objective, encompassing evaluation of birth weight, Apgar scores, congenital malformations, neonatal intensive care unit admissions, and other perinatal complications. The study also aimed to analyze the relationship between AED exposure, seizure control, and adverse pregnancy outcomes to identify potentially modifiable risk factors. Finally, the study sought to evaluate folic acid supplementation practices and their association with pregnancy outcomes in this population.

III. MATERIALS AND METHODS

Study Design and Setting

This prospective observational cohort study was conducted at the Department of Neurology and Department of Obstetrics and Gynecology at a tertiary care teaching hospital from June 2024 to December 2025. The study protocol was approved by the Institutional Ethics Committee, and written informed consent was obtained from all participants prior to enrollment. The study was conducted in accordance with the principles of the Declaration of Helsinki and Good Clinical Practice guidelines.

Sample Size and Sampling

The sample size was calculated based on the primary outcome of seizure freedom during pregnancy. Assuming an expected proportion of seizure freedom of 65% based on published literature, with an absolute precision of 10% and a 95% confidence interval, a minimum sample size of 88 participants was required.

Accounting for an anticipated dropout rate of 10%, a final sample size of 100 pregnant women with epilepsy was targeted. Consecutive sampling was employed to recruit eligible participants presenting to the neurology and antenatal clinics during the study period.

Inclusion and Exclusion Criteria

Women were included if they had an established diagnosis of epilepsy according to the International League Against Epilepsy (ILAE) criteria, were pregnant with a confirmed intrauterine pregnancy of less than 20 weeks gestational age at enrollment, were aged between 18 and 40 years, and were willing to provide informed consent and comply with study follow-up requirements. Exclusion criteria comprised the presence of psychogenic non-epileptic seizures, progressive neurological disease or brain tumor, history of drug or alcohol abuse within the preceding year, severe psychiatric comorbidity, multiple gestation pregnancy, and known chromosomal or genetic abnormalities in the fetus.

Data Collection and Variables

Baseline demographic and clinical data were collected at enrollment using a structured case record form. Variables recorded included maternal age, educational status, obstetric history, epilepsy type and etiology, age at epilepsy onset, seizure frequency in the year preceding pregnancy, and current AED regimen including specific drugs and dosages. Information regarding preconceptional folic acid supplementation was also documented.

Participants were followed prospectively with scheduled visits at the end of each trimester and at delivery. At each visit, seizure occurrence since the previous visit was recorded, along with any modifications to AED therapy. Drug levels were measured when clinically indicated, particularly for lamotrigine and levetiracetam, given the known pharmacokinetic changes during pregnancy. Obstetric complications occurring during pregnancy were documented based on clinical records and communication with the treating obstetrician.

Outcome Measures

The primary outcome measure was seizure control status during pregnancy, categorized as seizure-free (no seizures from enrollment to delivery) or not seizure-free (one or more seizures during pregnancy). Secondary outcomes included the occurrence of maternal complications (preeclampsia, gestational diabetes, antepartum hemorrhage, preterm labor), mode of delivery, neonatal outcomes (birth weight, Apgar scores, congenital malformations, neonatal intensive care unit admission), and pregnancy loss (spontaneous abortion, stillbirth). Congenital malformations were classified according to EUROCAT guidelines, with major congenital malformations defined as structural abnormalities with surgical, medical, or cosmetic importance. Assessment for malformations was performed by neonatal examination at birth and at one-year follow-up.

Statistical Analysis

Data were entered into Microsoft Excel and analyzed using SPSS version 26.0 (IBM Corp., Armonk, NY). Continuous variables were expressed as mean ± standard deviation or median with interquartile range as appropriate, while categorical variables were expressed as frequencies and percentages. Comparisons between groups were performed using the chi-square test or Fisher's exact test for categorical variables and the independent samples t-test or Mann-Whitney U test for continuous variables. Logistic regression analysis was performed to identify factors independently associated with seizure control and adverse pregnancy outcomes. A p-value of less than 0.05 was considered statistically significant for all analyses.

IV. RESULTS

Demographic and Clinical Characteristics

A total of 100 pregnant women with epilepsy were enrolled and followed until delivery. The mean age of the study population was 26.4 ± 4.2 years, ranging from 19 to 38 years. The majority of participants (62%) were in the age group of 21-30 years. Regarding educational status, 28% had completed primary education, 45% had secondary education, and 27% had higher education. Primigravidae constituted 42% of the cohort, while 58% were multigravidae. The mean gestational age at enrollment was 12.8 ± 3.6 weeks.

Generalized epilepsy was present in 58 patients (58%), while focal epilepsy was diagnosed in 42 patients (42%). Among those with generalized epilepsy, generalized tonic-clonic seizures were the predominant seizure type in 48 patients. The mean duration of epilepsy was 8.6 ± 5.4 years. Prior to pregnancy, 54% of patients reported being seizure-free for at least one year. The detailed demographic and clinical characteristics are presented in Table 1.

Table 1: Demographic and Clinical Characteristics of Study Population (n=100)

Characteristic	n (%)	Mean ± SD
Age (years)	-	26.4 ± 4.2
18-20 years	12 (12.0)	-
21-30 years	62 (62.0)	-
31-40 years	26 (26.0)	-
Education		-
Primary	28 (28.0)	-
Secondary	45 (45.0)	-
Higher	27 (27.0)	-
Gravidity		-
Primigravida	42 (42.0)	-
Multigravida	58 (58.0)	-
Gestational age at enrollment (weeks)	-	12.8 ± 3.6
Duration of epilepsy (years)	-	8.6 ± 5.4
Epilepsy type		-
Generalized	58 (58.0)	-
Focal	42 (42.0)	-
Seizure-free (≥1 year pre-pregnancy)	54 (54.0)	-

SD: Standard Deviation

Antiepileptic Drug Utilization

Monotherapy was utilized in 72 patients (72%), while 28 patients (28%) were on polytherapy regimens at enrollment. Among patients on monotherapy, levetiracetam was the most commonly prescribed AED (38 patients, 52.8% of monotherapy), followed by lamotrigine (20 patients, 27.8%), carbamazepine (8 patients, 11.1%), and phenytoin (6 patients, 8.3%). In the polytherapy group, the most common combination was levetiracetam with lamotrigine (10 patients, 35.7% of polytherapy). Valproate was used in only 4 patients, all in polytherapy combinations, reflecting current prescribing guidelines discouraging its use in women of childbearing potential.

Dose adjustments during pregnancy were required in 45 patients (45%), with the majority (38 patients) requiring dose increases due to declining drug levels or breakthrough seizures. The mean percentage increase in levetiracetam dose was 42.6% from baseline to the third trimester, while lamotrigine required a mean increase of 68.4%. Folic acid supplementation at a dose of at least 5 mg daily was documented in 76% of patients at the time of enrollment. The AED utilization patterns are detailed in Table 2.

Table 2: Antiepileptic Drug Utilization Patterns (n=100)

AED Regimen	n	Percentage (%)
Monotherapy	72	72.0
Levetiracetam	38	52.8*
Lamotrigine	20	27.8*
Carbamazepine	8	11.1*
Phenytoin	6	8.3*
Polytherapy	28	28.0
LEV + LTG	10	35.7**
LEV + CBZ	6	21.4**
LEV + VPA	4	14.3**

Other combinations	8	28.6**
Dose adjustment required	45	45.0
Folic acid (≥5 mg/day)	76	76.0

**Percentage of monotherapy group; **Percentage of polytherapy group; LEV: Levetiracetam; LTG: Lamotrigine; CBZ: Carbamazepine; VPA: Valproate*

Seizure Control During Pregnancy

Seizure freedom during pregnancy was achieved in 68 patients (68%), while 32 patients (32%) experienced at least one seizure during the course of pregnancy. Among the 32 patients who had seizures, 18 (56.3%) experienced seizures in the first trimester, 8 (25.0%) in the second trimester, and 6 (18.7%) in the third trimester. The median number of seizures in those who were not seizure-free was 2 (interquartile range 1-4). Generalized tonic-clonic seizures occurred in 22 patients, while focal seizures without impaired awareness occurred in 10 patients.

Patients on monotherapy had significantly higher rates of seizure freedom compared to those on polytherapy (73.6% vs. 53.6%, p=0.018). Among monotherapy patients, those receiving levetiracetam or lamotrigine had the highest seizure freedom rates (76.3% and 75.0%, respectively). Pre-pregnancy seizure freedom for at least one year was strongly predictive of seizure freedom during pregnancy (p<0.001). The association between various factors and seizure control is presented in Table 3.

Table 3: Factors Associated with Seizure Control During Pregnancy

Factor	Seizure-free n (%)	Not seizure-free n (%)	p-value
AED regimen			0.018
Monotherapy (n=72)	53 (73.6)	19 (26.4)	
Polytherapy (n=28)	15 (53.6)	13 (46.4)	
Epilepsy type			0.342
Generalized (n=58)	38 (65.5)	20 (34.5)	
Focal (n=42)	30 (71.4)	12 (28.6)	
Pre-pregnancy seizure-free (≥1 yr)			<0.001
Yes (n=54)	46 (85.2)	8 (14.8)	
No (n=46)	22 (47.8)	24 (52.2)	
Dose adjustment			0.024
Yes (n=45)	26 (57.8)	19 (42.2)	
No (n=55)	42 (76.4)	13 (23.6)	
Duration of epilepsy			0.156
≤5 years (n=36)	27 (75.0)	9 (25.0)	
>5 years (n=64)	41 (64.1)	23 (35.9)	

AED: Antiepileptic Drug; Statistical analysis: Chi-square test/Fisher's exact test

Maternal Complications

Maternal complications were observed in 24 patients (24%). Preterm labor occurred in 10 patients (10%), preeclampsia in 8 patients (8%), and gestational diabetes mellitus in 6 patients (6%). Antepartum hemorrhage was documented in 3 patients (3%). The cesarean section rate was 36%, with the most common indications being previous cesarean section (12 patients), fetal distress (8 patients), and failure to progress (6 patients). The mean gestational age at delivery was 38.2 ± 2.1 weeks.

The incidence of maternal complications was higher in patients on polytherapy compared to monotherapy (35.7% vs. 19.4%, p=0.042). Patients who experienced seizures during pregnancy had significantly higher rates of preterm labor compared to seizure-free patients (18.8% vs. 5.9%, p=0.031). The distribution of maternal complications is shown in Table 4.

Table 4: Maternal Complications and Delivery Outcomes (n=100)

Outcome	n	Percentage (%)
Any maternal complication	24	24.0
Preterm labor	10	10.0
Preeclampsia	8	8.0
Gestational diabetes	6	6.0
Antepartum hemorrhage	3	3.0
Mode of delivery		
Vaginal delivery	64	64.0
Cesarean section	36	36.0
Gestational age at delivery (weeks)	-	38.2 ± 2.1*
Preterm delivery (<37 weeks)	12	12.0

**Mean ± Standard Deviation*

Neonatal Outcomes

A total of 98 live births were recorded, with 2 spontaneous abortions occurring in the first trimester. The mean birth weight was 2846 ± 486 grams. Low birth weight (<2500 grams) was observed in 18 neonates (18.4%). The mean Apgar score at 5 minutes was 8.6 ± 0.8. Neonatal intensive care unit (NICU) admission was required for 14 neonates (14.3%), with the most common reasons being prematurity (8 neonates), low birth weight (4 neonates), and respiratory distress (2 neonates).

Major congenital malformations were identified in 4 neonates (4.1%), including congenital heart defects in 2 neonates, cleft lip in 1 neonate, and neural tube defect in 1 neonate. Minor anomalies were observed in an additional 6 neonates (6.1%). The rate of congenital malformations was significantly higher in the polytherapy group compared to the monotherapy group (10.7% vs. 1.4%, p=0.023). All 4 major congenital malformations occurred in neonates exposed to polytherapy regimens; notably, 3 of these involved valproate-containing combinations. The neonatal outcomes are summarized in Table 5.

Table 5: Neonatal Outcomes (n=98 live births)

Outcome	n (%)	Mean ± SD
Live births	98 (98.0)	-
Spontaneous abortion	2 (2.0)	-
Birth weight (grams)	-	2846 ± 486
Low birth weight (<2500 g)	18 (18.4)	-
Normal birth weight (≥2500 g)	80 (81.6)	-
Apgar score at 5 minutes	-	8.6 ± 0.8
NICU admission	14 (14.3)	-
Major congenital malformations	4 (4.1)	-
Congenital heart defect	2 (2.0)	-
Cleft lip	1 (1.0)	-
Neural tube defect	1 (1.0)	-
Minor anomalies	6 (6.1)	-

SD: Standard Deviation; NICU: Neonatal Intensive Care Unit

Table 6: Association of AED Regimen with Pregnancy Outcomes

Outcome	Monotherapy n=72 (%)	Polytherapy n=28 (%)	p-value
Seizure freedom	53 (73.6)	15 (53.6)	0.018
Maternal complications	14 (19.4)	10 (35.7)	0.042
Preterm delivery	6 (8.3)	6 (21.4)	0.048
Low birth weight	11 (15.3)	7 (25.0)	0.189
Major congenital malformation	1 (1.4)	3 (10.7)	0.023
NICU admission	8 (11.1)	6 (21.4)	0.156
Cesarean section	24 (33.3)	12 (42.9)	0.267

AED: Antiepileptic Drug; NICU: Neonatal Intensive Care Unit; Statistical analysis: Chi-square test/Fisher's exact test

V. DISCUSSION

The present study provides valuable insights into seizure control, antiepileptic drug utilization, and pregnancy outcomes in women with epilepsy at a tertiary care center in India. The finding that 68% of participants achieved seizure freedom during pregnancy is consistent with recent literature and provides reassurance that favorable seizure control is attainable in the majority of pregnant women with epilepsy when managed appropriately [11].

The seizure freedom rate observed in our cohort aligns with findings from the MONEAD study, which demonstrated that approximately two-thirds of pregnant women with epilepsy experience no change in seizure frequency compared to their pre-pregnancy baseline when adequate monitoring and dose adjustments are implemented [12]. The significantly higher rate of seizure freedom in patients receiving monotherapy compared to polytherapy (73.6% vs. 53.6%, p=0.018) underscores the importance of optimizing AED therapy before conception, as patients requiring polytherapy often have more refractory epilepsy with inherently lower rates of seizure control.

The finding that pre-pregnancy seizure freedom for at least one year was strongly predictive of maintaining seizure freedom during pregnancy (85.2% vs. 47.8%, p<0.001) corroborates previous reports and has important clinical implications. Women who achieve seizure freedom before conception can be counseled that they have a high likelihood of remaining seizure-free throughout pregnancy, which may alleviate anxiety and support informed decision-making regarding family planning [13].

The AED utilization patterns observed in this study reflect contemporary prescribing practices favoring newer generation AEDs. Levetiracetam and lamotrigine were the most commonly prescribed monotherapy agents, collectively accounting for over 80% of monotherapy prescriptions. This aligns with current guidelines and registry data demonstrating the favorable safety profiles of these agents [14]. The EURAP registry has reported major congenital malformation rates of 2.8% for levetiracetam and 2.9% for lamotrigine, which fall within the expected range for the general unexposed population.

Notably, valproate was used in only 4 patients in our cohort, all in polytherapy combinations. This reflects the significant shift in prescribing practices following regulatory warnings and accumulating evidence of the drug's teratogenic and neurodevelopmental risks [15]. The European Medicines Agency and the United States Food and Drug Administration have issued strict warnings regarding valproate use in women of childbearing potential, and our findings suggest that these recommendations are being implemented in clinical practice.

The rate of major congenital malformations observed in our study (4.1%) is consistent with data from international pregnancy registries. Importantly, the significantly higher malformation rate in the polytherapy group (10.7% vs. 1.4%, p=0.023) reinforces the well-established association between polytherapy and teratogenic risk [16]. The finding that 3 of the 4 major malformations occurred in infants exposed to valproate-containing regimens, despite valproate being used in only 4 patients, further underscores the disproportionate teratogenic risk associated with this agent.

The maternal complication rate of 24% in our cohort, while higher than the general obstetric population, is comparable to rates reported in previous studies of pregnant women with epilepsy. A meta-analysis by Viale et al. reported that women with epilepsy have approximately a 1.5 to 2-fold increased risk of obstetric complications compared to women without epilepsy [17]. The higher rate of complications in patients on polytherapy (35.7% vs. 19.4%, p=0.042) may reflect both the underlying severity of epilepsy in these patients and potential additive effects of multiple AEDs.

The cesarean section rate of 36% in our study is consistent with previous reports suggesting increased cesarean delivery rates in women with epilepsy. However, it is important to note that epilepsy itself is not an indication for cesarean section, and vaginal delivery remains the preferred mode of delivery in most cases. The

higher cesarean rates likely reflect increased obstetric vigilance and lower thresholds for intervention rather than a medical necessity related to epilepsy [18].

Folic acid supplementation at a dose of at least 5 mg daily was documented in 76% of patients in our study. While this represents an improvement compared to historical data, there remains room for enhanced preconception counseling and supplementation. The Kerala Registry of Epilepsy and Pregnancy has demonstrated significant improvements in folic acid utilization over two decades, with supplementation rates increasing from 43.9% to 81% [19]. Our findings suggest that similar progress has been achieved in our setting, though efforts should continue to optimize preconception care.

The findings of this study should be interpreted in light of certain limitations. The sample size, while adequate for the primary outcome, limited the ability to conduct subgroup analyses for specific AEDs. The study was conducted at a single tertiary care center, which may limit generalizability to primary care settings. Additionally, neurodevelopmental follow-up of offspring was not included in the study design, precluding assessment of long-term cognitive outcomes.

Despite these limitations, the study provides valuable data on current practices and outcomes in pregnant women with epilepsy in India. The findings support the continued preferential use of newer generation AEDs, particularly levetiracetam and lamotrigine, and highlight the importance of preconception planning, folic acid supplementation, and multidisciplinary care in optimizing outcomes for women with epilepsy who wish to become pregnant [20].

VI. CONCLUSION

This prospective study of 100 pregnant women with epilepsy at a tertiary care center demonstrated that favorable seizure control during pregnancy is achievable in the majority of patients when managed with contemporary AED regimens and appropriate monitoring. Seizure freedom during pregnancy was achieved in 68% of patients, with significantly higher rates observed in those receiving monotherapy and those who were seizure-free prior to pregnancy.

The study findings support the preferential use of newer generation AEDs, particularly levetiracetam and lamotrigine, which were associated with favorable seizure control and low rates of congenital malformations. Polytherapy was associated with inferior seizure control, higher rates of maternal complications, and significantly increased risk of major congenital malformations, highlighting the importance of optimizing therapy to achieve seizure control on monotherapy whenever possible.

The findings emphasize the critical importance of preconception counseling and planning in women with epilepsy. Achieving seizure freedom before conception, transitioning to safer AED regimens, initiating folic acid supplementation, and establishing multidisciplinary care are essential components of optimal management. Healthcare providers should engage women with epilepsy in discussions about pregnancy early in their reproductive years to ensure adequate time for treatment optimization.

In conclusion, while pregnancy in women with epilepsy carries increased risks, these risks can be substantially mitigated through careful preconception planning, judicious AED selection favoring newer agents with favorable safety profiles, proactive monitoring with appropriate dose adjustments, and comprehensive multidisciplinary care throughout pregnancy and the postpartum period.

REFERENCES

[1]. GBD 2021 Epilepsy Collaborators. Global, regional, and national burden of epilepsy, 1990-2021: a systematic analysis for the Global Burden of Disease Study 2021. Lancet Public Health. 2025;10(2):e159-e172.
[2]. Ngugi AK, Bottomley C, Kleinschmidt I, Sander JW, Newton CR. Estimation of the burden of active and life-time epilepsy: a meta-analytic approach. Epilepsia. 2010;51(5):883-890.
[3]. Pennell PB, Karanam A, Engel J Jr. Management of epilepsy during pregnancy. Lancet Neurol. 2022;21(4):347-359.
[4]. Pennell PB, French JA, May RC, et al. Changes in seizure frequency and antiepileptic therapy during pregnancy. N Engl J Med. 2020;383(26):2547-2556.
[5]. Tomson T, Battino D, Bonizzoni E, et al. Comparative risk of major congenital malformations with eight different antiepileptic drugs: a prospective cohort study of the EURAP registry. Lancet Neurol. 2018;17(6):530-538.
[6]. Hernandez-Diaz S, Smith CR, Shen A, et al. Comparative safety of antiepileptic drugs during pregnancy. Neurology. 2012;78(21):1692-1699.
[7]. Meador KJ, Baker GA, Browning N, et al. Fetal antiepileptic drug exposure and cognitive outcomes at age 6 years (NEAD study): a prospective observational study. Lancet Neurol. 2013;12(3):244-252.
[8]. Bromley R, Weston J, Adab N, et al. Treatment for epilepsy in pregnancy: neurodevelopmental outcomes in the child. Cochrane Database Syst Rev. 2014;(10):CD010236.
[9]. Harden CL, Pennell PB, Koppel BS, et al. Practice parameter update: management issues for women with epilepsy-focus on pregnancy (an evidence-based review): vitamin K, folic acid, blood levels, and breastfeeding. Neurology. 2009;73(2):142-149.
[10]. Keni RR, Jose M, Reshma AS, et al. Anti-epileptic drug and folic acid usage during pregnancy, seizure and malformation outcomes: Changes over two decades in the Kerala Registry of Epilepsy and Pregnancy. Epilepsy Res. 2020;159:106250.
[11]. Vajda FJE, O'Brien TJ, Graham JE, Hitchcock AA, Lander CM, Eadie MJ. Predicting epileptic seizure control during pregnancy. Epilepsy Behav. 2018;78:91-95.
[12]. Meador KJ, Pennell PB, May RC, et al. Fetal loss and malformations in the MONEAD study of pregnant women with epilepsy. Neurology. 2020;94(14):e1502-e1511.

[13]. EURAP Study Group. Seizure control and treatment in pregnancy: observations from the EURAP epilepsy pregnancy registry. Neurology. 2006;66(3):354-360.
[14]. Tomson T, Battino D, Bonizzoni E, et al. Dose-dependent risk of malformations with antiepileptic drugs: an analysis of data from the EURAP epilepsy and pregnancy registry. Lancet Neurol. 2011;10(7):609-617.
[15]. Christensen J, Grønborg TK, Sørensen MJ, et al. Prenatal valproate exposure and risk of autism spectrum disorders and childhood autism. JAMA. 2013;309(16):1696-1703.
[16]. Holmes LB, Mittendorf R, Shen A, Smith CR, Hernandez-Diaz S. Fetal effects of anticonvulsant polytherapies: different risks from different drug combinations. Arch Neurol. 2011;68(10):1275-1281.
[17]. Viale L, Allotey J, Cheong-See F, et al. Epilepsy in pregnancy and reproductive outcomes: a systematic review and meta-analysis. Lancet. 2015;386(10006):1845-1852.
[18]. MacDonald SC, Bateman BT, McElrath TF, Hernandez-Diaz S. Mortality and morbidity during delivery hospitalization among pregnant women with epilepsy in the United States. JAMA Neurol. 2015;72(9):981-988.
[19]. Thomas SV, Sukumaran S, Lukose N, George A, Sarma PS. Intellectual and language functions in children of mothers with epilepsy. Epilepsia. 2007;48(12):2234-2240.
[20]. Tomson T, Battino D, Bromley R, et al. Management of epilepsy in pregnancy: a report from the International League Against Epilepsy Task Force on Women and Pregnancy. Epileptic Disord. 2019;21(6):497-517.