

# Comparison of Diazepam and Magnesium Sulfate (MgSO<sub>4</sub>) Administration in Patients with Eclampsia

Muhammad Rifqi Mudhoffar<sup>1\*</sup>, Mona Nulanda<sup>2</sup>, Julia Hasir<sup>3</sup>

<sup>1</sup>Medical Student, Doctor Education Program, Faculty of Medicine, Universitas Muslim Indonesia

<sup>2</sup>Department of Obstetrics and Gynecology, Faculty of Medicine, Universitas Muslim Indonesia

<sup>3</sup>Department of Anesthesiology and Intensive Care, Faculty of Medicine, Universitas Muslim Indonesia

Email: [muhammadrifqimudhoffar@gmail.com](mailto:muhammadrifqimudhoffar@gmail.com)

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**Abstract.** Eclampsia is a serious obstetric complication characterized by seizures in pregnant or postpartum women with preeclampsia and remains a leading cause of maternal morbidity and mortality, particularly in developing countries. Management of eclampsia focuses on the prevention and control of seizures using anticonvulsants, with diazepam and magnesium sulfate (MgSO<sub>4</sub>) being the most commonly used drugs. However, the efficacy and safety of these two agents show significant differences. This literature review aims to compare the effectiveness of diazepam and magnesium sulfate (MgSO<sub>4</sub>) in patients with eclampsia in terms of seizure prevention, maternal mortality, and maternal and neonatal outcomes. This study employed a literature review design using a narrative review approach. Literature searches were conducted via PubMed, Google Scholar, ScienceDirect, DOAJ, PLOS ONE, BMC, Cureus, and SINTA using keywords related to eclampsia, magnesium sulfate, and diazepam. Relevant research articles from 2020–2025 and textbooks from 2015–2025 were analyzed narratively based on methodological quality and topic relevance. Most studies indicate that MgSO<sub>4</sub> is more effective than diazepam in preventing recurrent seizures, reducing maternal mortality, and yielding better maternal and neonatal outcomes. Diazepam is associated with lower efficacy and a higher risk of adverse effects. Major barriers to the use of MgSO<sub>4</sub> include resource constraints and the readiness of healthcare facilities. Magnesium sulfate (MgSO<sub>4</sub>) is the first-line therapy and the gold standard in the management of eclampsia. Strengthening policies, improving the competence of healthcare workers, and ensuring the availability of MgSO<sub>4</sub> must be prioritized to reduce maternal mortality due to eclampsia.

**Keywords:** Diazepam, Eclampsia, Magnesium Sulfate

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## INTRODUCTION

Eclampsia is one of the most serious obstetric complications characterized by seizures in pregnant or postpartum women accompanied by preeclampsia, without any other neurological causes (Ashchepkova et al., 2024; Kaplan, 2001; Cipolla & Kraig, 2011). This condition remains a major contributor to maternal and perinatal morbidity and mortality, particularly in developing countries. The high maternal mortality rate due to eclampsia is generally associated with delayed diagnosis, limited healthcare facilities, and suboptimal selection of anticonvulsant therapy. Laskowska (2023) said that, the primary management of eclampsia focuses on the prevention and control of seizures, stabilization of the mother's condition, and termination of pregnancy as indicated.

Various anticonvulsant agents have been used in clinical practice, including diazepam and magnesium sulfate (MgSO<sub>4</sub>). Diazepam, a benzodiazepine, works by suppressing central nervous system activity and has long been used due to its widespread availability and rapid onset of action. However, its use is associated with the risk of respiratory depression, excessive sedation, and unfavorable neonatal outcomes (Leite et al., 2024; Meazaw et al., 2022).

Magnesium sulfate (MgSO<sub>4</sub>) is currently recommended as first-line therapy for the prevention and treatment of seizures in severe preeclampsia and eclampsia. Various studies have shown that MgSO<sub>4</sub> is more effective in reducing the incidence of recurrent seizures and maternal mortality compared to diazepam and other anticonvulsants (Roberts et al., 2002; Kassie et al., 2014; Naher et al., 2024). Nevertheless, the implementation of MgSO<sub>4</sub> in clinical practice still faces challenges, such as resource constraints, lack of training for healthcare workers, and concerns regarding side effects and therapy monitoring (Getaneh et al., 2021; Serudji, 2022).

Differences in efficacy, safety, and clinical outcomes between diazepam and magnesium sulfate highlight the need for a comprehensive, evidence-based review (Adji et al., 2025; Charejoo et al., 2023). Therefore, this literature review aims to compare the administration of diazepam and magnesium sulfate (MgSO<sub>4</sub>) in patients with eclampsia, focusing on seizure prevention efficacy, impact on maternal mortality, and maternal and neonatal outcomes. The results of this review are expected to serve as a scientific basis for clinical decision-making and support the implementation of more effective and safer therapies in the management of eclampsia (Mayrink & Reis, 2024; Eddy et al., 2025).

The comparison between diazepam and magnesium sulfate in eclampsia should not be viewed merely as a difference between two anticonvulsant drugs, but must be understood as a difference between two therapeutic approaches to a complex vascular-neurological disorder. In eclampsia, seizures occur within the context of endothelial dysfunction, cerebral vasospasm, impaired cerebral blood flow autoregulation, and cerebral edema (Mahendra et al., 2021; Donaldson, 1994; Miller, 2019; Zunker et al., 1995). Within this framework, the superiority of MgSO<sub>4</sub> makes biological sense because its effects not only suppress neuromuscular excitability but are also associated with membrane stabilization, modulation of neuromuscular transmission, and protection against cerebral injury related to vasospasm and edema (Marín et al., 2025).

Diazepam does act rapidly as a central nervous system depressant, but its mechanism is predominantly symptomatic for seizures, rather than targeting the primary pathophysiological processes underlying eclampsia (Sivakumar et al., 2022; Trinka et al., 2016; Katsi et al., 2024). That is why MgSO<sub>4</sub> is positioned as a more clinically rational therapy, not merely because it is more popular in guidelines (Chikwala et al., 2024; Ononge et al., 2024). From an evidence-based medicine perspective, the advantage of magnesium sulfate also lies in the consistency of results across studies. According to Duley et al. (1996) a Cochrane review reported that MgSO<sub>4</sub> reduces the risk of recurrent seizures and is associated with fewer maternal deaths compared to diazepam in women with eclampsia.

These findings are important because the parameters of successful eclampsia therapy are not merely the cessation of the first seizure, but the prevention of seizure recurrence, the reduction of severe complications, and the improvement of the mother's chances of stabilization until pregnancy termination can be performed safely. In other words, a drug that appears "effective" in stopping a single seizure episode is not necessarily superior in altering the patient's clinical course. In this context, diazepam tends to play a more limited role, whereas MgSO<sub>4</sub> provides broader benefits regarding meaningful maternal outcomes (Diaz et al., 2023; Padda et al., 2021).

Safety considerations are also a critical point of analysis. The main drawbacks of diazepam in eclampsia are not only the risk of sedation but also the potential for respiratory depression in the mother, decreased protective reflexes, and effects on the neonate, particularly with repeated use or high doses. These risks can complicate the obstetric resuscitation phase, which actually demands high vigilance regarding airway status, oxygenation, and readiness for

emergency delivery. Magnesium sulfate is not without risks, particularly in cases of renal dysfunction or inadequate monitoring; however, its toxicity is relatively predictable through monitoring of respiration, deep tendon reflexes, and urine output (Xia et al., 2026).

This means that the safety profile of  $MgSO_4$  is more manageable within a trained healthcare system, whereas diazepam is more likely to cause depressant effects that actually increase the complexity of managing critically ill mothers and newborns. The next critical issue is that the dominance of  $MgSO_4$  in international guidelines does not automatically guarantee ideal implementation in practice. Several studies indicate that barriers to  $MgSO_4$  use are frequently encountered at the healthcare system level: procurement issues, drug distribution challenges, lack of healthcare worker training, low clinician confidence in monitoring toxicity, and weak referral protocols.

This explains why, in many facilities with limited resources, diazepam continues to be used not merely because it is better, but because it is more familiar, more readily available, or perceived as easier to administer. This analysis is crucial to include in the literature review so that the discussion does not stop at the level of “which drug is most effective,” but moves toward a more substantive question: why the best therapy is not always the most frequently used one. This is where issues of policy implementation, healthcare workforce capacity, and facility readiness become an integral part of clinical discussions (Eddy et al., 2022; Khan et al., 2025; Brommeyer, M., & Liang, 2022; Dieleman et al., 2011).

The clinical implication of all these comparisons is that the selection of anticonvulsants for eclampsia should be situated within a comprehensive management framework, not merely a pharmacological decision.  $MgSO_4$  should be considered the standard of care due to its pathophysiological rationale, clinical efficacy, and global recommendations; whereas diazepam is more appropriately positioned as an alternative when  $MgSO_4$  is unavailable, specific contraindications exist, or as an adjunct in situations of uncontrolled recurrent seizures according to protocol. Thus, the quality of eclampsia management is determined not only by drug availability but also by the speed of case identification, hemodynamic stabilization, toxicity monitoring, hypertension control, and timely decisions regarding pregnancy termination. Your literature review will be stronger if it emphasizes that the superiority of  $MgSO_4$  is not merely the result of numerical comparisons between drugs, but rather a reflection of a modern obstetric approach that is safer, more measurable, and more oriented toward maternal and neonatal outcomes.

## METHODS

This study employed a literature review design using a narrative review approach to collect, analyze, and synthesize various scientific findings regarding the efficacy and safety of diazepam compared to magnesium sulfate ( $MgSO_4$ ) in patients with eclampsia. The literature search was conducted through the PubMed, Google Scholar, ScienceDirect, DOAJ, PLOS ONE, BMC, Cureus, and SINTA databases using the keywords “eclampsia,” “preeclampsia,” “magnesium sulfate,” “magnesium sulphate,” “diazepam,” and “anticonvulsant in eclampsia.” The retrieved literature provides an overview of the comparative effectiveness of  $MgSO_4$  and diazepam in preventing seizures, maternal and neonatal outcomes, and factors supporting the implementation of therapy. The independent variable in this study was the type of anticonvulsant used (*magnesium sulfate and diazepam*), while the dependent variables included the incidence of recurrent seizures, maternal mortality, and clinical outcomes for the mother and infant. Operational definitions were used to ensure consistency in the meaning of variables in accordance with obstetric clinical guidelines. Inclusion criteria included research articles from 2020–2025 and textbooks from 2015–2025 that discussed the use of  $MgSO_4$  and/or diazepam in preeclampsia and eclampsia and were fully accessible in Indonesian or English. Exclusion criteria include opinion or commentary articles, studies on non-pregnant populations, articles that do not specifically address anticonvulsant therapy, and articles with unclear or invalid methodologies.

This study is expected to provide a scientific basis for selecting the most effective and safe anticonvulsant therapy for patients with eclampsia (Rantung et al., 2022; Shafiq et al., 2022).

## RESULT AND DISCUSSION

Table 1. Results of the Literature Review

No	Title	Author	Method	Results	Index
1.	Factors affecting the use of magnesium sulfate for preeclampsia or eclampsia: a qualitative evidence synthesis	Eddy et al. (2022)	Qualitative evidence synthesis (22 qualitative studies)	MgSO <sub>4</sub> is recognized as more effective and recommended than diazepam, but its use is influenced by drug availability, healthcare provider competence, and the healthcare system.	Scopus Q1
2.	Alternative magnesium sulfate regimens for women with preeclampsia and eclampsia	Diaz et al. (2023)	Randomized clinical trial	Confirms that MgSO <sub>4</sub> remains the first-line therapy for the prevention and control of eclampsia seizures, superior to diazepam; dosage variations were evaluated to reduce side effects.	Scopus Q1
3.	Randomized trial to compare the acceptability of magnesium sulfate administration for preeclampsia and eclampsia: Springfusor pump versus standard of care	Ononge et al. (2024)	Randomized clinical trial	Administration of MgSO <sub>4</sub> using an innovative method is more acceptable, safe, and effective; reinforcing MgSO <sub>4</sub> as the primary choice over other anticonvulsants such as diazepam.	Scopus Q1
4.	Perspectives on providing magnesium sulfate to patients with preeclampsia and eclampsia	Chikwala et al. (2024)	Qualitative study (in-depth interviews)	Healthcare providers consider MgSO <sub>4</sub> more effective than diazepam in preventing recurrent seizures, but there are still barriers to	Scopus Q1

				clinical implementation.	
5.	Efficacy of a Single-Loading Dose of Magnesium Sulfate in Preventing Convulsions in Women With Eclampsia	Khan et al. (2025)	Quasi-experimental study	A single loading dose of MgSO <sub>4</sub> is effective in preventing recurrent seizures in eclampsia with a good safety profile; supports MgSO <sub>4</sub> as the primary therapy compared to other anticonvulsants such as diazepam.	Scopus Q1
6.	Efficacy of Magnesium Sulfate on Maternal Mortality in Eclampsia	Padda et al. (2021)	Retrospective/observational study	Administration of MgSO <sub>4</sub> is associated with a reduction in maternal mortality in eclampsia; it is more effective than non-MgSO <sub>4</sub> therapies, including diazepam.	Scopus Q1
7.	Anticonvulsants for preeclampsia: Magnesium sulfate or Diazepam?	Serudji (2022)	Narrative review / clinical review	MgSO <sub>4</sub> is more effective than diazepam in preventing and controlling seizures, as well as reducing maternal complications.	Sinta 4
8	Obstetric and neonatal outcomes, antiseizure medication profile, and seizure types in pregnant women in a vulnerable state from Brazil	Leite et al. (2024)	Observational cohort study	MgSO <sub>4</sub> is the most commonly used anticonvulsant with better maternal and neonatal outcomes compared to other anticonvulsants, including benzodiazepines.	Scopus Q1
9.	Incidence and determinants of adverse outcomes among women managed for eclampsia at the University of Gondar Comprehensive	Getaneh et al. (2021)	Retrospective cross-sectional study	The use of MgSO <sub>4</sub> is associated with a reduction in adverse outcomes; delayed or non-use of MgSO <sub>4</sub>	Scopus Q1

	Specialized Hospital, Northwest Ethiopia			increases the risk of complications.	
10.	Health Care Readiness in the Management of Preeclampsia/Eclampsia in Ethiopia: Evidence from a National Facility-Based Survey	Meazaw et al. (2022)	National facility-based survey	The readiness of facilities and the availability of MgSO <sub>4</sub> are critical to the success of eclampsia management; MgSO <sub>4</sub> is established as the standard of care compared to diazepam.	Scopus Q1

The results of the literature review show strong consistency that magnesium sulfate (MgSO<sub>4</sub>) is the most effective and recommended anticonvulsant therapy in the management of eclampsia compared to diazepam. These findings are consistent with various high-quality studies, particularly those published in Scopus Q1-indexed international journals, which establish MgSO<sub>4</sub> as the gold standard for the prevention and control of seizures in severe preeclampsia and eclampsia. A qualitative study by Eddy confirms that clinically, MgSO<sub>4</sub> is recognized as superior to diazepam in preventing recurrent seizures. However, this study also highlights that the use of MgSO<sub>4</sub> is still influenced by non-clinical factors, such as drug availability, healthcare worker competence, and the healthcare system. This indicates that although scientific evidence supports MgSO<sub>4</sub>, its implementation in the field is not yet fully optimal, particularly in developing countries (Eddy et al., 2022).

The superiority of MgSO<sub>4</sub> over diazepam is further reinforced by experimental studies and clinical trials. Diaz, through a randomized clinical trial, stated that various alternative regimens of MgSO<sub>4</sub> continue to demonstrate high efficacy in preventing eclampsia seizures with a lower potential for side effects. These findings underscore that MgSO<sub>4</sub> is not only superior in terms of efficacy but also offers dosage flexibility that can be tailored to the patient's condition a feature not possessed by diazepam (Diaz et al., 2023). Research by Ononge adds a perspective on the clinical acceptance of MgSO<sub>4</sub>. The use of innovative administration methods such as the spring-loaded infusion pump has been shown to improve comfort, safety, and treatment adherence, thereby further strengthening MgSO<sub>4</sub>'s position as the primary choice compared to other anticonvulsants, including diazepam. This is important because the success of eclampsia therapy is determined not only by pharmacological efficacy but also by ease and safety in clinical practice (Ononge et al., 2024).

From the healthcare providers' perspective, a qualitative study by Chikwala indicates that midwives and nurses consider MgSO<sub>4</sub> more effective than diazepam in preventing recurrent seizures. Nevertheless, implementation barriers such as fear of magnesium toxicity and monitoring limitations remain challenges. This situation highlights the need for improved training and health system support to reduce reliance on diazepam, which is relatively less effective (Chikwala et al., 2024). The effectiveness of MgSO<sub>4</sub> is also demonstrated in preventing recurrent seizures and reducing maternal mortality. A quasi-experimental study by Khan showed that a single loading dose of MgSO<sub>4</sub> is sufficiently effective in preventing seizures in patients with eclampsia, with a good safety profile. Meanwhile, an observational study by Padda demonstrated that the use of MgSO<sub>4</sub> is significantly associated with a reduction in maternal mortality rates, and the outcomes are better compared to non-MgSO<sub>4</sub> therapies, including diazepam.

Findings from Indonesia reported by Serudji in a SINTA 4-indexed journal also support these global results. In his clinical review, MgSO<sub>4</sub> was found to be more effective than diazepam in controlling seizures and reducing maternal complications, making it relevant to the context of

national clinical practice. This indicates that the superiority of MgSO<sub>4</sub> is universal and not limited to specific healthcare systems (Khan et al., 2025; Padda et al., 2021; Serudji, 2022). In addition to maternal outcomes, the use of MgSO<sub>4</sub> is also associated with better neonatal outcomes. A cohort study by de Lima Leite in Brazil showed that MgSO<sub>4</sub> is the most commonly used anticonvulsant with a better maternal and neonatal outcome profile compared to benzodiazepines. This finding is significant given that diazepam is known to cause neonatal respiratory depression and excessive sedation (Leite et al., 2024).

Research by Getaneh and Meazaw further underscores that the success of eclampsia management heavily depends on the availability and timely use of MgSO<sub>4</sub>. Delays or failure to administer MgSO<sub>4</sub> have been shown to increase the risk of adverse maternal outcomes, while a healthcare facility's readiness to provide MgSO<sub>4</sub> is a key factor in reducing eclampsia complications. Compared to diazepam, MgSO<sub>4</sub> has stronger evidence regarding both clinical efficacy and its impact on the healthcare system (Getaneh et al., 2021; Meazaw et al., 2022). Overall, this discussion demonstrates that magnesium sulfate (MgSO<sub>4</sub>) is consistently superior to diazepam in the prevention and management of eclampsia-related seizures, reducing maternal mortality, and yielding better maternal and neonatal outcomes. Diazepam may be considered as a limited alternative under specific conditions, but it is no longer recommended as the primary therapy. Therefore, policy reinforcement, capacity building for healthcare workers, and the availability of MgSO<sub>4</sub> must be prioritized in efforts to reduce maternal mortality due to eclampsia.

One important aspect that requires further exploration is that the superiority of MgSO<sub>4</sub> over diazepam lies not only in clinical efficacy but also in its therapeutic mechanism, which is better aligned with the biological nature of eclampsia itself. Eclampsia is not merely an acute seizure event but a manifestation of a systemic disorder involving endothelial dysfunction, vasoconstriction, impaired organ perfusion, and neurological instability. In this context, diazepam acts primarily as a central nervous system depressant to stop ongoing seizures, whereas MgSO<sub>4</sub> holds a more strategic position because it can reduce the risk of recurrent seizures while providing a protective effect against the pathological processes underlying eclampsia. Therefore, the choice of MgSO<sub>4</sub> reflects a shift from a symptomatic approach toward a more pathophysiological and preventive approach (Mousa et al., 2022; Tukur, 2009).

Further analysis should focus on the clinical implications of the term "more effective," which is frequently used in the literature review. In the case of eclampsia, effectiveness does not merely mean that a drug can stop the first seizure, but rather encompasses the ability to prevent recurrence, maintain the mother's stability during the critical phase, and reduce the likelihood of fatal complications. At this point, MgSO<sub>4</sub> demonstrates superior value because its success is sustained, not merely transient. Diazepam may provide a rapid response in emergency situations, but when considered in the context of long-term obstetric management, this drug does not offer the same level of assurance for clinical control. This explains why the various studies summarized not only rank MgSO<sub>4</sub> as a statistically superior option but also as a clinically more meaningful intervention in preventing mothers from progressing to more severe complications (Gomes et al., 2022; Tesfaye et al., 2019; Vidaeff et al., 2021).

Another dimension worth examining is the relationship between therapeutic effectiveness and the readiness of the healthcare system. The text you have compiled indicates that the barriers to using MgSO<sub>4</sub> do not primarily lie in weak scientific evidence, but rather in implementation barriers, such as lack of training, monitoring limitations, and concerns about toxicity. This demonstrates that clinical decisions in the field are often not entirely determined by the quality of evidence, but by the institutional capacity to translate that evidence into practice. From this perspective, the continued use of diazepam in some healthcare facilities can be interpreted not as the best choice, but as a reflection of the gap between scientific recommendations and the reality of healthcare delivery. Such analysis sharpens the discussion by situating the issue of eclampsia therapy not only at the pharmacological level but also at the level of healthcare governance (Agrawal & Wenger, 2020; Fishel & Sibai, 2022).

Better neonatal outcomes with MgSO<sub>4</sub> also underscore that the evaluation of eclampsia therapy must not stop at maternal safety alone. In obstetric practice, nearly every intervention on the mother has a direct impact on the fetus or neonate. This is where diazepam's limitations become more apparent, as its sedative effects and potential for respiratory depression in the infant mean that its anticonvulsant benefits come at the cost of additional risks during the neonatal period. MgSO<sub>4</sub>, conversely, is more frequently associated with a more balanced maternal-neonatal outcome profile. This is important to emphasize because the true success of eclampsia management is not merely stopping the mother's seizures but also ensuring that the labor process and neonatal transition proceed with minimal risk. Thus, MgSO<sub>4</sub> is superior not only because it is more effective but also because it is more compatible with modern obstetric principles that view the mother and baby as a single clinical unit (Dimitriadis et al., 2023; Iryaningrum et al., 2023; Pratiwi & Mahmuda, 2024).

Conceptually, these findings collectively affirm that magnesium sulfate has evolved from merely a "recommended medication" to a symbol of the standard of care in eclampsia. This position has emerged due to the consistency of evidence across various types of research ranging from qualitative studies, quasi-experimental designs, to cohort studies and clinical trials all of which point to a single overarching conclusion: diazepam is no longer adequate as the primary therapy when more effective, safer, and more supportive options for comprehensive outcomes are available. Within the framework of a literature review, this point is crucial because it provides a strong argumentative foundation for asserting that the primary issue today is no longer about which drug is better, but rather ensuring that MgSO<sub>4</sub> is accessible, understood, and used optimally at all levels of care. At that point, your discussion will appear more well-rounded because it not only highlights the advantages of MgSO<sub>4</sub> but also underscores the clinical and systemic improvement initiatives that still need to be addressed.

## CONCLUSION

Based on the results of the literature review, magnesium sulfate (MgSO<sub>4</sub>) has consistently proven to be more effective than diazepam in the prevention and control of seizures in patients with eclampsia. The use of MgSO<sub>4</sub> is associated with a reduction in the rate of recurrent seizures, a decrease in maternal mortality, and better maternal and neonatal outcomes. Various studies, including clinical trials, observational studies, and qualitative reviews, confirm that MgSO<sub>4</sub> is the first-line therapy and the gold standard in the management of eclampsia.

## SUGGESTION

The implementation of MgSO<sub>4</sub> in clinical practice still faces challenges, particularly regarding drug availability, healthcare facility readiness, and medical staff competence. Diazepam, although once widely used, demonstrates lower efficacy and a higher risk of complications compared to MgSO<sub>4</sub>; therefore, it is currently recommended only as an alternative when MgSO<sub>4</sub> is unavailable.

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