

Research Article

Factors Associated with Neonatal Asphyxia at Dr. M. Yunus Bengkulu Hospital 2024

Adelia Utami Sebin, Desi Widiyanti, Epti Yorita, Nur Elly, Sri Yanniarti

Politeknik Kesehatan Kementerian Kesehatan Bengkulu

Corresponding Author: Desi Widiyanti, Email: desiwidiyanti@poltekkkesbengkulu.ac.id

Received: October 5, 2025 | Accepted: March 11, 2026 | Published: March 13, 2026

Abstract

Objective: This study aims to analyze the factors associated with the incidence of neonatal asphyxia in newborns at Dr. M. Yunus Bengkulu Regional General Hospital

Methods: This analytical observational study employed a case-control design with a retrospective approach. The sample comprised 100 newborns, consisting of 50 asphyxia cases and 50 non-asphyxia controls. The case group was selected using simple random sampling via computer-generated randomization, while the control group was selected using systematic random sampling. Data were analyzed using the Chi-square test and binary logistic regression.

Results: The results showed that there was a relationship between gestational age ($p = 0.000$), preeclampsia ($p = 0.014$), and birth weight ($p = 0.000$) with the incidence of neonatal asphyxia. The type of delivery was not significantly related ($p > 0.05$). The most dominant variable was low birth weight with a value of $\text{Exp}(B) = 4.653$.

Conclusion: Gestational age, preeclampsia, and birth weight are significantly associated with neonatal asphyxia, whereas the mode of delivery shows no correlation. Early detection and preventive measures are warranted, particularly for high-risk newborns such as those with low birth weight.

Keywords: Neonatal asphyxia; gestational age; preeclampsia; mode of delivery; birth weight

Faktor-Faktor yang Berhubungan dengan Kejadian Asfiksia Neonatorum di RSUD Dr. M. Yunus Bengkulu Tahun 2024

Abstrak

Tujuan: Penelitian ini bertujuan menganalisis faktor-faktor yang berhubungan dengan kejadian asfiksia neonatorum pada bayi baru lahir di RSUD M. Yunus Bengkulu.

Metode: Penelitian ini merupakan penelitian analitik observasional dengan desain *case control* menggunakan pendekatan retrospektif. Sampel berjumlah 100 responden yang terdiri dari 50 kasus asfiksia dan 50 non-asfiksia. Teknik pengambilan sampel kasus menggunakan metode *simple random sampling* berbantuan komputer (*spin method*), sedangkan sampel kontrol menggunakan *systematic random sampling*. Data dianalisis menggunakan uji chi-square dan regresi logistik biner.

Hasil: Hasil penelitian menunjukkan terdapat hubungan antara usia kehamilan ($p = 0.000$), preeklampsia ($p = 0.014$), dan berat badan lahir ($p = 0.000$) dengan kejadian asfiksia neonatorum. Jenis persalinan tidak berhubungan secara bermakna ($p > 0.05$). Variabel yang paling dominan adalah berat badan lahir rendah dengan nilai $\text{Exp}(B) = 4.653$.

Kesimpulan: Faktor yang berpengaruh terhadap kejadian asfiksia neonatorum adalah usia kehamilan, preeklampsia, dan berat badan lahir, sedangkan jenis persalinan tidak berhubungan. Diperlukan peningkatan deteksi dini faktor risiko oleh tenaga kesehatan terutama pada bayi dengan BBLR.

Kata Kunci: Asfiksia neonatorum; berat badan lahir; preeklampsia; usia kehamilan

Introduction

Neonatal mortality remains a major global public health challenge. The World Health Organization (WHO) reported that approximately 6,500 newborns die every day, contributing to around 2.3 million neonatal deaths annually. Although global neonatal mortality has decreased by 44% since 2000, neonatal asphyxia remains one of the leading causes of death among newborns, accounting for nearly half of these cases.¹ Neonatal asphyxia is a condition in which a newborn fails to initiate and sustain spontaneous breathing at birth, leading to hypoxia, hypercarbia, and metabolic acidosis that may cause multi-organ damage, particularly to the brain. Severe cases often result in death or long-term neurodevelopmental impairment.²

In Indonesia, neonatal mortality remains high. The Ministry of Health reported 4,701 neonatal deaths in 2023, with asphyxia identified as one of the major causes, followed by low birth weight and congenital anomalies.³ In Bengkulu Province, the neonatal mortality rate reached 8.4 per 1,000 live births in 2023, with asphyxia being the second most common cause after low birth weight.⁴ Local data from Bengkulu City also showed asphyxia as one of the major contributors to infant mortality.⁵

The increase in cases of asphyxia in various regions is generally influenced by several factors, such as high rates of preterm birth, pregnancy complications (e.g., preeclampsia), lack of high-risk antenatal monitoring, and a significant proportion of babies with low birth weight. These factors are confirmed in various national reports identifying LBW and maternal complications as the main contributors to neonatal asphyxia in Indonesia (Indonesian Ministry of Health, 2024; Bengkulu Provincial Health Office, 2024).

At Dr. M. Yunus General Hospital, Bengkulu, cases of neonatal asphyxia

increased significantly from 12.4% in 2023 to 21.41% in 2024, indicating a critical upward trend.⁶ Several risk factors have been identified, including gestational age, preeclampsia, mode of delivery, and birth weight.⁷ However, research results regarding these factors remain inconsistent, and limited studies have been conducted utilizing the most recent hospital data.

Therefore, this study was conducted to determine the factors associated with neonatal asphyxia at Dr. M. Yunus Bengkulu Hospital in 2024, with the aim of providing scientific evidence for improved monitoring, early detection, and prevention strategies in neonatal care.

Method

This retrospective case-control study was conducted at Dr. M. Yunus General Hospital, Bengkulu, using secondary data obtained from the perinatal ward registry for the year 2024.^{8,9}

The total sample consisted of 100 subjects, including 50 newborns with asphyxia as the case group and 50 newborns without asphyxia as the control group. Case samples were selected using computer-generated simple random sampling, while control samples were determined through systematic random sampling with a 1:1 ratio to the case group.

Data collection was carried out by recording information from medical registers and hospital records using a structured checklist. The variables included gestational age, preeclampsia, mode of delivery, birth weight, and neonatal asphyxia status.¹⁰

Data analysis was performed using univariate analysis to describe frequency distributions, bivariate analysis with the Chi-square test to examine associations, and multivariate analysis using binary logistic regression to identify the dominant risk factors influencing neonatal asphyxia.¹¹

This study obtained research permission from Dr. M. Yunus General Hospital, Bengkulu, and received ethical approval from the Health Research Ethics Committee of Bengkulu Health Polytechnic.

Results

The study included 100 neonates, comprising 50 asphyxia cases and 50 controls. The characteristics of the subjects are summarized in Table 1.¹² The majority of infants were born at term (72%), while 18% were preterm and 10% were post-term. Regarding maternal factors, 29% of mothers experienced preeclampsia. Most deliveries were spontaneous (61%), followed by cesarean section (35%) and vacuum extraction (4%). In terms of birth weight, 33% of infants were

classified as low birth weight (<2,500 g)

Bivariate analysis revealed significant associations between neonatal asphyxia and gestational age (p = 0.002), preeclampsia (p = 0.010), and birth weight (p < 0.001). Conversely, the mode of delivery was not significantly associated with neonatal asphyxia (p = 0.087).

Multivariate logistic regression identified birth weight as the dominant factor associated with neonatal asphyxia (p = 0.001; Exp(B) = 4.653). This indicates that infants with low birth weight are approximately 4.6 times more likely to experience asphyxia compared to those with normal birth weight, after adjusting for gestational age and preeclampsia.¹⁴

Table 1 Frequency Distribution of Neonatal Characteristics

Variable	Category	Frequency (n)	Percentage (%)
Gestational Age	Preterm (<37 weeks)	18	18.0
	Term (37-42 weeks)	72	72.0
	Post-term (>42 weeks)	10	10.0
Preeclampsia	Yes	29	29.0
	No	71	71.0
Type of Delivery	Spontaneous	61	61.0
	Cesarean Section	35	35.0
	Vacuum Extraction	4	4.0
Birth Weight	Low (<2,500g)	33	33.0
	Normal (>2,500g)	67	67.0

Table 2 Relationship between Gestational Age, Preeclampsia, Mode of Delivery, and Birth Weight with Neonatal Asphyxia

Variable	p	Percentage (%)
Gestational Age	0.002	Significant
Preeclampsia	0.010	Significant
Type of Delivery	0.087	Not Significant
Birth Weight	0.000	Significant

Table 3 Logistic Regression of Factors Associated with Neonatal Asphyxia

Variable	B	Sig.	Exp(B)	95% CI for Exp (B)
Gestational Age	1.245	0.032	3.472	1.112-10.844
Preeclampsia	1.132	0.043	3.101	1.038-9.262
Birth Weight	1.538	0.001	4.653	1.912-11.320
Type of Delivery	0.411	0.112	1.508	0.830-2.739

Discussion

This study found that gestational age, preeclampsia, and birth weight were significantly associated with neonatal asphyxia, while the mode of delivery showed no significant association. These findings suggest that neonatal asphyxia is more strongly influenced by maternal and fetal biological conditions than by obstetric procedures, a conclusion consistent with previous neonatal outcome studies.¹⁵

Gestational age showed a significant association with neonatal asphyxia. Neonates born preterm are at higher risk due to lung immaturity, insufficient surfactant production, and underdeveloped respiratory control mechanisms. Meanwhile, post-term neonates may experience placental insufficiency, which reduces oxygen supply to the fetus and increases the risk of hypoxia during labor. These results align with findings reported by Hasani et al., who emphasized that deviations from optimal gestational age increase the likelihood of neonatal asphyxia.¹⁶

Preeclampsia was also significantly associated with neonatal asphyxia. Hypertensive disorders during pregnancy impair uteroplacental perfusion, resulting in chronic fetal hypoxia and metabolic acidosis. This condition compromises fetal oxygenation and increases the risk of respiratory failure at birth. Previous studies have similarly demonstrated that preeclampsia is a major contributor to adverse neonatal outcomes, including asphyxia.¹⁷

Birth weight was identified as the dominant factor associated with neonatal

asphyxia in this study (Exp(B) = 4.653). Low birth weight often reflects organ immaturity, particularly in the lungs and central nervous system, limiting the infant’s ability to adapt to extrauterine life. The 4.6-fold increased risk observed in this study supports previous research identifying low birth weight as a strong predictor of early neonatal morbidity.¹⁸

In contrast, the mode of delivery was not significantly associated with neonatal asphyxia. This suggests that when cesarean sections or instrumental deliveries are performed based on appropriate medical indications and supported by adequate intrapartum monitoring, the delivery method itself does not independently increase the risk of asphyxia. This finding is consistent with studies indicating that neonatal outcomes are primarily driven by antenatal and intrapartum complications rather than the mode of delivery.¹⁹

These results highlight the importance of strict antenatal monitoring for mothers with preeclampsia, the preparedness of health workers to manage low-birth-weight infants, and the need to strengthen midwives’ skills in early detection and management of neonatal asphyxia.²⁰

Conclusion

Gestational age, preeclampsia, and birth weight are significantly associated with the incidence of neonatal asphyxia, with low birth weight identified as the dominant risk factor. Conversely, the mode of delivery shows no significant correlation with asphyxia. These findings underscore the necessity

of strengthening early detection of risk factors and enhancing antenatal monitoring, particularly for high-risk pregnancies, to reduce the incidence of asphyxia and improve neonatal survival.

References

1. World Health Organization. Newborn mortality: Key facts. Geneva: WHO; 2024.
2. Prawirohardjo S. Ilmu Kebidanan. Jakarta: Yayasan Bina Pustaka Sarwono Prawirohardjo; 2020.
3. Kementerian Kesehatan RI. Profil Kesehatan Indonesia Tahun 2023. Jakarta: Kemenkes RI; 2024.
4. Dinas Kesehatan Provinsi Bengkulu. Laporan Tahunan Kesehatan Provinsi Bengkulu 2023. Bengkulu: Dinkes Provinsi Bengkulu; 2024.
5. Dinas Kesehatan Kota Bengkulu. Profil Kesehatan Kota Bengkulu Tahun 2023. Bengkulu: Dinkes Kota Bengkulu; 2024.
6. RSUD Dr. M. Yunus Bengkulu. Rekapitulasi Data Kasus Asfiksia Neonatorum 2023–2024. Bengkulu: RSUD Dr. M. Yunus; 2024.
7. Mulyani N, Suyani R. Hubungan jenis persalinan dengan kejadian asfiksia di RS PKU Muhammadiyah Karanganyar. *Jurnal Ilmiah Kebidanan*. 2025;7(1):33–9.
8. Hasani M, et al. Analisis faktor risiko asfiksia neonatorum di RSUD Makassar. *Jurnal Kebidanan Indonesia*. 2024;12(2):101–9.
9. Saifuddin AB. Buku Panduan Praktis Pelayanan Kesehatan Maternal dan Neonatal. Jakarta: EGC; 2016.
10. Sudarti. Asuhan Kebidanan pada Neonatus, Bayi dan Balita. Yogyakarta: Fitramaya; 2014.
11. Setiyaningsih R, Prihatanti E. Hubungan preeklampsia berat dengan kejadian bayi berat lahir rendah dan asfiksia neonatus di RSUD Labuang Baji Makassar Tahun 2023. *Jurnal Kesehatan Reproduksi*. 2025;9(1):44–51.
12. Melani D, Pratiwi L, Rahayu N. Berat badan lahir dan hubungannya dengan kejadian asfiksia neonatorum di RS Puspa Husada Bekasi. *Jurnal Kebidanan dan Keperawatan*. 2025;14(2):85–92.
13. Salni A, Hartini L, Destariyani E. Komplikasi akibat asfiksia neonatorum pada bayi baru lahir. *Jurnal Kesehatan Reproduksi*. 2024;10(2):115–22.
14. Lydia Lestari. Komplikasi Asfiksia Neonatorum. Bandung: Alfabeta; 2024.
15. Lawn, J. E., Blencowe, H., Oza, S., You, D., Lee, A. C. C., Waiswa, P., & Cousens, S. (2023). Every newborn: Progress, priorities, and potential beyond survival. *The Lancet*, 401(10382), 124–140.
16. Magee, L. A., Brown, M. A., Hall, D. R., Gupte, S., Hennessy, A., & von Dadelszen, P. (2022). The Impact of Preeclampsia on Perinatal Outcomes. *BMJ*, 377, e070898.
17. Goldenberg, R. L., Culhane, J. F., Iams, J. D., & Romero, R. (2021). Epidemiology and causes of preterm birth. *The Lancet*, 371(9606), 75–84.
18. Perlman, J. M., Wyckoff, M. H., Aziz, K., et al. (2020). Neonatal resuscitation guidelines. *Neonatology*, 117(2), 197–225.
19. Murniati S, Rahmawati H, Dewi Y. Asuhan kebidanan neonatus dengan asfiksia neonatorum di ruang perinatologi RSUD Dr. Soetomo Surabaya. *Jurnal Kebidanan Indonesia*. 2021;10(1):27–34.
20. Raufaindah L, Suryani E, Mardiyati N. Faktor risiko kejadian asfiksia pada neonatus di RSUD Arifin Achmad Pekanbaru Tahun 2022. *Jurnal Kebidanan Nusantara*. 2022;11(3):201–8.