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# The Relationship Between Low Birth Weight and Premature Babies and Asphyxia Incidents at General Ahmad Yani Regional Hospital Metro City

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## ABSTRACT

Asphyxia is a condition in which a baby cannot immediately breathe spontaneously and regularly. Babies with a history of fetal distress before birth will generally experience asphyxia at birth. The causes of asphyxia can originate from maternal, fetal, and placental factors. The presence of hypoxia and tissue ischemia cause functional and biochemical changes in the fetus. The impacts that can be caused by asphyxia include organ damage, severe hypoxia such as heart, lungs, liver, intestines, kidneys, and brain damage. This study generally aims to analyze the relationship between low birth weight and premature babies with the incidence of asphyxia at General Ahmad Yani Regional Hospital, Metro City. This study is a quantitative study with a case-control study design. The case population is all newborns with asphyxia, the control population is all newborns without asphyxia, the study sample amounted to 66 respondents consisting of 33 case samples and 33 control samples, which were taken using a simple random sampling technique. Analysis used the chi-square test with a 95% confidence level. The results of the study on asphyxia babies (case group) obtained a frequency distribution of low birth weight babies of 57.6% and a frequency distribution of premature babies of 68.2%. The results of the statistical test showed a relationship between low birth weight babies and the incidence of asphyxia with a p-value = 0.001 and OR = 0.154 that low birth weight babies have a 0.154 times greater risk of experiencing asphyxia, as well as premature babies with the incidence of asphyxia with a p-value = 0.034 and OR = 0.267 which means that premature babies will have a 0.267 greater risk of experiencing asphyxia than babies who are not premature. The conclusion of the study is a relationship between low birth weight and premature babies with the incidence of asphyxia. Efforts made to prevent the incidence of asphyxia can be a comprehensive pregnancy check-up, especially for mothers with high-risk factors such as too young/too old age, pregnancy with comorbidities, low nutritional status, or a history of problematic pregnancies and increasing promotive and preventive measures related to the risk of low birth weight and prematurity with the incidence of asphyxia.

**Keywords:** Asphyxia, low birth weight, prematurity

## INTRODUCTION

*World Health Organization*(WHO) in 2022 as many as 2.4 million newborns died in the neonatal period (the first month of life) as many as 75% of neonates died in the first week of life due to Asphyxia Neonatorum. The countries that contributed the highest neonatal deaths were in Sub-Saharan Africa with 43% of deaths, followed by Central Asia with 36% of deaths. Deaths in the neonatal period include those occurring in the first 24 hours of life caused by asphyxia, premature birth, infection, and congenital abnormalities.(WHO, 2021).

The most common causes of neonatal death are LBW (34.5%) and asphyxia (27.8%) based on the Indonesian Health Profile in 2021.(Ministry of Health of the Republic of Indonesia, 2022)In 2022, the leading causes of neonatal death were low birth weight (LBW) at 28.2% and asphyxia at 25.3%.(Ministry of Health of the Republic of Indonesia, 2023). In 2023, the number of deaths during the neonatal period, the main causes of death are Respiratory and Cardiovascular at 1%, Low Birth Weight Conditions with a percentage of 0.7%.(Ministry of Health of the Republic of Indonesia, 2024).

In 2021, the number of LBW babies in the Indonesian Health Profile decreased compared to the previous year, namely 3.1% experiencing LBW conditions.(Ministry of Health of the Republic of Indonesia, 2022). In 2022, 3.3% of babies with low birth weight (LBW) experienced LBW conditions.(Ministry of Health of the Republic of Indonesia, 2023)In 2023, 3.9% of babies were born with low birth weight (LBW). This is a significant increase compared to 2022, when approximately 2.5% of babies were born with low birth weight.(Ministry of Health of the Republic of Indonesia, 2024).

Premature birth data for 2022 in the Lampung Province Health Profile with a percentage of 0.1%(Lampung Provincial Health Office, 2023). In 2023 there was an increase with a presentation of 0.5%(Lampung Provincial Health Office, 2024). Premature births in 2022 in the Metro City Health Profile were 0.0%(Metro City Health Office, 2023). In 2023 there was an increase with a presentation of 5.0%(Metro City Health Office, 2024).

Asphyxia can result in organ damage, severe hypoxia, such as damage to the heart, lungs, liver, intestines, kidneys, and brain. However, brain damage is the most concerning and perhaps the least likely to fully recover.by Tasew and friends in 2018While the causes of asphyxia can originate from maternal, fetal and placental factors, the presence of hypoxia and tissue ischemia causes functional and biochemical changes in the fetus.by Setyarini & Suprapti in 2016Asphyxia is one of the causes of mortality and morbidity in newborns and will have several impacts on the later stages of life.by Fajarwati and friends in 2016Some of

the impacts that can arise include organ failure, neonatal neurological problems such as seizures in babies, coma, Hypoxic Ischemic Encephalopathy(Thania et al., 2023).

Based on the research on LBW with the occurrence of Neonatal Asphyxia, it was reported that the results of LBW were 123 respondents (41.0%), the number of babies experiencing moderate asphyxia was 140 respondents (47.0%). The Odds Ratio (OR) value was 7.526. The results of the chi-square statistical test obtained a p value of 0.000 (P <0.05), which means there is a relationship between LBW and the occurrence of Neonatal Asphyxia at Dr. H. Abdul Moeloek Hospital, Bandar Lampung.(Wulandari et al., 2020).

The results of the study on prematurity with the incidence of Neonatal Asphyxia, it can be reported that the incidence of premature babies was 32 (48.5%) newborns, the incidence of Neonatal Asphyxia was 33 (50%). With an Odds Ratio (OR) value of 6.133. A p value of 0.001 ($p \leq 0.05$) was obtained. Based on statistical tests using Chi Square, a p value of 0.016 was obtained for prolonged labor and p = 0.000 for premature babies (p <0.05), there was a significant relationship between prematurity and the incidence of Neonatal Asphyxia at the Fatiha Clinic in 2022.(Sari et al., 2024).

Lampung Province Health Profile 2021: The cause of neonatal deaths (0-28 days) was 119 cases of asphyxia.(Lampung Provincial Health Office, 2022). The cause of neonatal death in 2022 was 1,608 cases of asphyxia with a presentation of 7.6%(Lampung Provincial Health Office, 2023). In 2023, there was a decrease from 2022 with 1,510 cases of asphyxia (7.2%) with neonatal deaths.(Lampung Provincial Health Office, 2024).

In the 2021 Metro City Health Profile, the cause of neonatal death (0-28 days) was 4 cases of asphyxia.(Metro City Health Office, 2022)In 2022, the cause of neonatal death with asphyxia was 1.1%.(Metro City Health Office, 2023)In 2023, there were 15 cases of neonatal asphyxia deaths, a 3.9% increase from the previous year.(Metro City Health Office, 2024)Based on the background of the problem, the author is interested in conducting a study entitled "The Relationship between Low Birth Weight and Prematurity with the Incidence of Asphyxia at General Ahmad Yani Regional Hospital, Metro City."

## METHOD

This study is a quantitative study with a case-control design that aims to analyze the relationship between low birth weight (LBW) and premature babies with the incidence of

asphyxia at General Ahmad Yani Regional General Hospital, Metro City. The study was conducted in April–May 2025 using medical record data of babies treated during 2024. The study population consisted of all newborns, with a sample of 66 respondents consisting of 33 case groups and 33 control groups selected using a simple random sampling technique. Data collection was carried out using a checklist sheet based on medical records. Data analysis included univariate analysis to describe the distribution of variables and bivariate analysis using the Chi-Square test with a 95% confidence level (α=0.05) to determine the relationship between LBW and prematurity with the incidence of asphyxia.

## RESULTS

**Table 1. Overview of Parents of Infants Treated in the Perinatology Ward in 2024**

| Characteristics | Category | N | % |
|---|---|---|---|
| Mother's Education | Elementary School | 4 | 6.1 |
| | JUNIOR HIGH SCHOOL | 16 | 24.2 |
| | SENIOR HIGH SCHOOL | 30 | 45.5 |
| | D3 | 1 | 1.5 |
| | D4/S1 | 14 | 21.2 |
| | S2 | 1 | 1.5 |
| | **Total** | **66** | **100** |
| Mother's Job | Housewife | 49 | 74.2 |
| | Self-employed | 4 | 6.1 |
| | Farmer | 3 | 4.5 |
| | Other | 10 | 15.2 |
| | **Total** | **66** | **100** |
| Father's Education | Elementary School | 11 | 16.7 |
| | JUNIOR HIGH SCHOOL | 9 | 13.6 |
| | SENIOR HIGH | 33 | 50.0 |
| | | 1 | 1.5 |
| | | 12 | 18.2 |

| | | | |
|---|---|---|---|
| | SCHOOL | | |
| | D3 | | |
| | D4/S1 | | |
| | **Total** | **66** | **100** |
| Father's occupation | Self-employed | 23 | 34.8 |
| | Farmer | 13 | 19.7 |
| | Laborer | 8 | 12.1 |
| | Other | 22 | 33.3 |
| | **Total** | **66** | **100** |

Table 1 shows that the education of the parents of the baby is in the high school category for mothers 30 (45.5%), fathers 33 (50.0%), the most common category of mother's occupation is housewife 49 (74.2%), the most common category of fathers is self-employed 23 (34.8%).

**Table 2. Frequency Distribution of Low Birth Weight Babies at General Ahmad Yani Regional Hospital, Metro City**

| No | Characteristics | Category | N | % |
|---|---|---|---|---|
| 1. | Low birth weight | Low birth weight | 38 | 57.6 |
| | | Not LBW | 28 | 42.4 |
| | | **Total** | **66** | **100** |

Based on table 2, it is known that from 66 respondents, it was shown that babies with LBW had the largest category, namely 57.6% (38 babies) and the lowest category was babies without LBW, namely 42.4% (28 babies).

**Table 3. Frequency Distribution of Premature Babies at General Ahmad Yani Regional Hospital, Metro City**

| No | Characteristics | Category | N | % |
|---|---|---|---|---|
| 1 | Premature | Premature | 45 | 68.2 |
| | | Not Premature | 21 | 31.8 |
| | | **Total** | **66** | **100** |

Based on table 3, it is known that of the 66 respondents, premature babies were the largest category, namely 68.2% (45 babies) and the lowest category was non-premature babies, namely 31.8% (21 babies).

**Table 4. Analysis of the Relationship between Low Birth Weight Babies and Asphyxia Incidents at General Ahmad Yani Regional Hospital, Metro City**

| Low birth weight | Asphyxia Incident | | | | Total | | P-Value | OR | 95% CI |
|---|---|---|---|---|---|---|---|---|---|
| | Asphyxia (Case) | | No Asphyxia (Control) | | | | | | |
| | N | % | N | % | N | % | | | |
| Low birth weight | 12 | 36.4 | 26 | 78.8 | 38 | 57.6 | | | 0.051-0.460 |
| Not LBW | 21 | 63.6 | 7 | 21.2 | 28 | 42.4 | 0.001 | 0.154 | |
| **Total** | **33** | **100.0** | **33** | **100.0** | **66** | **100.0** | | | |

Table 4 shows that there were 33 babies with asphyxia, 36.4% of whom (12 babies) experienced Low Birth Weight and babies who were not asphyxiated, 78.8% of whom (26 babies) experienced Low Birth Weight. The results of statistical tests using chi-square obtained a p value of 0.001, which means Ho is rejected and Ha is accepted, meaning there is a significant relationship between Low Birth Weight Babies and Asphyxia Incidents. Furthermore, the Odd Ratio (OR) value = 0.154 (CI 95% = 0.051-0.460) is shown, from these results it shows that babies with Low Birth Weight have a 0.154 times greater risk of experiencing Asphyxia.

**Table 5. Analysis of the Relationship between Premature Babies and Asphyxia Incidents at General Ahmad Yani Regional Hospital, Metro City**

| Premature | Asphyxia Incident | | Total | P-Value | OR | 95% CI |
|---|---|---|---|---|---|---|
| | Asphyxia (Case) | No Asphyxia | | | | |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | (Control) | | | | | |
| | **N** | **%** | **N** | **%** | **N** | % | | | |
| Premature | 18 | 54.5 | 27 | 81.8 | 45 | 68.2 | | | 0.087 |
| Not Premature | 15 | 45.5 | 6 | 18.2 | 21 | 31.8 | 0.034 | 0.267 | - 0.816 |
| **Total** | **33** | **100.0** | **33** | **100.0** | **66** | **100.0** | | | |

Based on table 5. shows that there are 33 babies with asphyxia and 54.5% (18 babies) who experienced Premature and non-asphyxia babies among them 81.8% (27 babies) experienced Premature. The results of statistical tests using chi-square obtained a p value of 0.034, Ho was rejected and Ha was accepted which means there is a significant relationship between Premature Babies and Asphyxia Incidents at General Ahmad Yani Regional Hospital, Metro City. Furthermore, the Odd Ratio (OR) value is shown at 0.267 (CI 95% = 0.087-0.816) which means that Premature babies will have a 0.267 greater risk of experiencing Asphyxia than babies who are not Premature.

## DISCUSSION

The results of the study showed a significant relationship between low birth weight (LBW) and the incidence of asphyxia at General Ahmad Yani Regional Hospital, Metro City (p=0.001). Infants born weighing less than 2,500 grams have a higher risk of experiencing respiratory problems compared to infants with normal birth weight. This condition can be explained physiologically because LBW infants generally have less than optimal organ maturity, especially the respiratory system, resulting in a lower ability to adapt to extrauterine life. Lung immaturity causes the oxygen exchange process to not take place effectively, increasing the risk of asphyxia at birth. This finding is evident in the high number of LBW infants who experience asphyxia compared to infants with normal birth weight. Therefore, preventing LBW is an important step that not only affects the baby's birth weight but also contributes to reducing the risk of serious complications such as asphyxia.

The results of this study are in line with the research of Wulandari et al. (2020) which showed a significant relationship between LBW and the incidence of neonatal asphyxia (p=0.000; OR=7.526), so that babies with LBW have a greater risk of experiencing asphyxia than babies with normal birth weight. Similar findings were also reported by Pratama et al.

(2023) who obtained a p value of 0.002 with an OR=1.87, which indicates that babies with low birth weight have a greater chance of experiencing asphyxia. In addition, research by Anisa et al. (2024) also found a significant relationship between LBW and the incidence of neonatal asphyxia (p=0.003; OR=3.217). The similarity of these results strengthens that LBW is one of the important risk factors contributing to the incidence of asphyxia in newborns.

This study also showed a significant association between prematurity and the incidence of asphyxia (p=0.034). Infants born before 37 weeks of gestation have a higher risk of respiratory distress because their organs, particularly the lungs, are not yet fully developed. Lung immaturity results in suboptimal surfactant production, making it difficult for the alveoli to expand fully after birth. Furthermore, premature infants are also more susceptible to circulatory disorders, hypothermia, and neonatal infections, which further increase the risk of asphyxia. These conditions explain that prematurity is a significant factor affecting a baby's ability to adapt to life outside the womb. Therefore, efforts to prevent premature birth through improving the quality of antenatal care, monitoring high-risk pregnancies, educating pregnant women about pregnancy danger signs, and providing appropriate obstetric care are essential to reduce the incidence of asphyxia in newborns.

The results of this study are consistent with those of Resiyanthi et al. (2023) who reported a relationship between premature birth and the incidence of asphyxia (p=0.006). Similarly, a study by Muslimah and Dian (2024) obtained results showing a significant relationship between prematurity and the incidence of asphyxia (p=0.000; OR=11.56), while a study by Sari et al. (2024) also found that premature babies have approximately six times greater risk of experiencing asphyxia than full-term babies (p=0.001; OR=6.133). The consistency of the results of this study with various previous studies indicates that prematurity is a consistent risk factor for the incidence of neonatal asphyxia. However, the incidence of asphyxia in premature babies can also be influenced by other maternal factors, such as infection during pregnancy, premature rupture of membranes, and preeclampsia, which were not analyzed in depth in this study.

## CONCLUSION

Based on the results of the research that has been conducted on "The Relationship between Low Birth Weight and Premature Births with the Incidence of Asphyxia at General

Ahmad Yani Regional Hospital, Metro City", the researcher can draw the following conclusions:

1. The proportion of LBW at General Ahmad Yani Regional Hospital, Metro City was 57.6% (38 babies).
2. The proportion of premature babies at General Ahmad Yani Regional Hospital, Metro City was 68.2% (45 babies).
3. There is a relationship between LBW and the incidence of asphyxia at General Ahmad Yani Regional Hospital, Metro City with a p-value of 0.001 and OR = 0.154 indicating that there is a statistically significant relationship.
4. There is a relationship between prematurity and asphyxia incidents at General Ahmad Yani Regional Hospital, Metro City with a p-value of 0.034 and OR = 0.267 indicating that there is a statistically significant relationship.

## LIMITATIONS

This study has several limitations. First, it used secondary data in the form of medical records, so the completeness and accuracy of the data depend on the available records. Second, the LBW variable has not been classified by severity, thus not being able to describe the magnitude of asphyxia risk in each LBW category. Third, this study did not analyze maternal factors that could potentially influence the incidence of asphyxia, such as infection during pregnancy, premature rupture of membranes, and preeclampsia. Therefore, the relationship between LBW, prematurity, and asphyxia cannot be fully explained.

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