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Article

Maternal Risk Factors Associated With Low Birth Weight Infants At Dr. M. Djamil Hospital, Padang (2023–2024)

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A B S T R A C T

The Infant Mortality Rate (IMR) in Indonesia remains higher than in developed countries, with one of the main contributing factors being Low Birth Weight (LBW) infants. The World Health Organization (WHO) reports that the global prevalence of LBW ranges from 15% to 20% of all births. In Indonesia, the prevalence of LBW based on the 2022 Indonesian Nutritional Status Survey (SSGI) was 6%, while in West Sumatra, the LBW rate was recorded at 4.4%. At Dr. M. Djamil Hospital Padang, data from 2023–2024 showed that the incidence of LBW reached 47.49% in 2023 and increased to 52.92% in 2024. LBW increases the risk of neonatal mortality by up to 20 times and has the potential to cause long-term complications. This study aims to analyze the relationship between maternal factors and low birth weight outcomes at Dr. M. Djamil Hospital, Padang, in 2023–2024. This research used a quantitative study design with a cross-sectional approach. The sample consisted of 58 postpartum mothers who met the inclusion criteria, selected using the Consecutive Sampling technique. The study found that 37.9% of newborns had LBW, 36.2% of mothers were either too young or too old, 37.9% were primiparous, 41.4% had preterm gestational age, and 39.7% experienced hypertensive disorders during pregnancy. Additionally, 43.1% of infants had severe asphyxia based on Apgar scores, 82.8% required NICU care, and 53.4% had comorbid asphyxia-related conditions. Bivariate analysis using the chi-square test showed significant associations between maternal age (p=0.018), parity (p=0.028), gestational age (p=0.024), and pregnancy morbidity (p=0.029) with LBW. There is a significant relationship between maternal age, parity, gestational age, and pregnancy morbidity with the incidence of low birth weight. Effective interventions are needed to reduce the prevalence of LBW and its associated complications. Low Birth Weight (LBW), Infant Mortality Rate (IMR), Maternal Factors, Neonatal Outcomes, Dr. M. Djamil Hospital Padang.

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I. INTRODUCTION

The Infant Mortality Rate (IMR) is a crucial indicator of the health status of a population. Globally, the IMR has decreased significantly in recent decades, with the global average in 2022 recorded at 17 deaths per 1,000 live births. However, the distribution of IMR remains uneven, with Sub-Saharan Africa having the highest rate of 27 deaths per 1,000 live births. In Indonesia, IMR has also decreased from 26 per 1,000 live births in 2010 to 16.85 in 2020, though it remains higher than in developed countries, where IMR is below 2 per 1,000 live births. The Indonesian Minister of Health, Budi Gunadi Sadikin, reported that the IMR in Indonesia is still above 15 per 1,000 live births[1].

One of the main factors contributing to high IMR is Low Birth Weight (LBW). WHO defines LBW as infants born weighing less than 2,500 grams, regardless of gestational age. LBW accounts for 60-80% of infant deaths, and infants with LBW are at a 20-fold increased risk of neonatal mortality compared to those with normal birth weight. The global prevalence of LBW is estimated to be 15-20% of all births, with the highest rates in South Asia and Sub-Saharan Africa. In Indonesia, LBW remains a significant issue, with a prevalence of 6% according to the 2022 Indonesian Nutritional Status Survey (SSGI). Neonatal deaths due to LBW account for 22,362 cases or approximately 1.32% of all deaths in Indonesia[2].

WHO classifies LBW into three categories: Low Birth Weight (LBW) (1,500-2,499 grams), Very Low Birth Weight (VLBW) (1,000-1,499 grams), and Extremely Low Birth Weight (ELBW) (<1,000 grams). The lower the birth weight, the higher the risk of mortality and complications. More than 20 million infants are born with LBW each year, with nearly 95% of cases occurring in low- to middle-income countries. In Southeast Asia, Indonesia has one of the highest LBW rates[3].

National data from 38 provinces in 2023 shows that 84.3% of newborns were weighed, and 3.9% were classified as LBW, an increase from 2.5% in 2022. In West Sumatra, 4.4% of 80,950 weighed newborns had LBW. In Padang, 459 out of 13,190 newborns (3.5%) were LBW in 2023, up from 296 cases (2.25%) in the previous year[4].

The impact of LBW on infant health and long-term development is substantial. LBW infants are more susceptible to infections, respiratory disorders, and other complications that can hinder growth. Long-term effects include stunting, developmental delays, cognitive impairments, and an increased risk of metabolic diseases such as diabetes and hypertension later in life.

Risk factors for LBW include maternal age (too young <20 years or too old >35 years), high parity (more than three previous pregnancies), maternal morbidities during pregnancy, and preterm birth. Several studies have identified these factors as strongly correlated with LBW. In 2023, Rizkika reported that maternal age, parity, pregnancy morbidities, and gestational age were associated with LBW. Wardana (2022) also reported that 37.6% of mothers were in the high-risk age group, with 18.6% of their infants born with LBW[6].

To reduce LBW prevalence, the Indonesian government has implemented various strategies, including increasing antenatal care coverage (at least six visits during pregnancy) and the Planning for Delivery and Prevention of Complications (P4K) program. This program aims to improve knowledge among pregnant women, their families, and spouses about high-risk pregnancies and safe delivery planning. With effective interventions, LBW rates in Indonesia are expected to continue decreasing, thus improving maternal and child health outcomes[7].

At Dr. M. Djamil Hospital Padang, a major referral hospital in Central Sumatra handling maternal and neonatal emergencies, LBW remains a significant concern. Data from 2023 shows that out of 697 births, 331 (47.49%) were LBW, and in 2024, out of 633 births, 335 (52.92%) were LBW. This research is crucial because LBW is a leading cause of neonatal death, and addressing maternal factors related to LBW is essential to mitigate the associated risks.

II. METHODS

This study uses an analytical approach with a quantitative design and a cross-sectional method. The purpose of this study is to analyze the relationship between maternal factors and neonatal outcomes, specifically the incidence of low birth weight (BBLR) in newborns at RS Dr. M. Djamil Padang during the period of 2023-2024. Data collection was performed at a single point in time to assess the relationship between independent and dependent variables.

The study was conducted at RS Dr. M. Djamil Padang from September 2024 to February 2025, involving all babies born with low birth weight (BBLR) during this period, with a total population of 1,330 babies. The inclusion criteria for this study were mothers who gave birth to babies with a birth weight of less than 2500 grams, with complete medical records, and who delivered between 2023 and 2024. The exclusion criteria included cases with incomplete or invalid medical records.

Sampling was performed using the consecutive sampling technique, where data was collected from all eligible cases that met the inclusion criteria until the required sample size of 58 was achieved. Secondary data was obtained from medical records containing information on maternal health and neonatal outcomes, such as birth weight and associated risk factors. Data analysis was performed using univariate analysis to describe the distribution of variables and bivariate analysis using the Chi-square test to examine the relationship between maternal factors and the occurrence of low birth weight in newborns.

III. RESULT

The study aimed to analyze various factors associated with the incidence of Low Birth Weight (BBLR) at RS. Dr. M. Djamil Padang. Both univariate and bivariate analyses were conducted to examine factors such as maternal age, parity, gestational age, maternal morbidity during pregnancy, Apgar score, treatment room, comorbidities in infants, and discharge status.

In the univariate analysis, it was found that 37.9% of infants were born with BBLR, 32.8% with Very Low Birth Weight (BBLSR), and 29.3% with Extremely Low Birth Weight (BBLASR). Regarding maternal age, the majority of the mothers were either classified as "too young" or "too old," each group representing 36.2% of the total, while 27.6% were within the ideal age range for childbirth. Most mothers were primiparous, with 37.9% of the respondents having their first child. In terms of gestational age, 41.4% of the infants were preterm, 27.6% were born at term, and 31.0% were postterm.

Concerning maternal health during pregnancy, hypertension was the most common condition, affecting 39.7% of the mothers, followed by anemia in 31.0% and gestational diabetes mellitus (DMG) in 29.3%. As for the Apgar score, the majority of infants (43.1%) experienced severe asphyxia, 36.2% had moderate asphyxia, and 20.7% showed normal scores. The majority of the infants (82.8%) were treated in the Neonatal Intensive Care Unit (NICU), with 13.8% receiving care in the Special Care Nursery (SCN) and 3.4% in shared care rooms. Regarding comorbidities in infants, asphyxia was the most prevalent condition, affecting 79.3% of the infants, followed by pneumonia in 6.9% and neonatal sepsis in 13.8%. The discharge status indicated that 62.1% of the infants did not survive, while 37.9% survived.

In the bivariate analysis, significant relationships were observed between maternal age and the occurrence of BBLR (p-value = 0.018). Mothers categorized as "too young" or "too old" were more likely to give birth to infants with BBLR. In particular, 50.0% of the infants born to mothers considered "too young" had BBLR, while 47.3% of those born to mothers considered "too old" experienced the same condition. Conversely, the incidence of BBLR among mothers in the ideal age range was lower, at 40.9%.

A similar relationship was found between parity and BBLR (p-value = 0.028). Primiparous mothers had the highest incidence of BBLR (63.6%), while multiparous and grand multiparous mothers had lower percentages of BBLR, with 22.7% and 13.6% respectively. Furthermore, a significant association was found between gestational age and BBLR (p-value = 0.024). Preterm infants had the highest incidence of BBLR (68.2%), followed by term infants (18.2%) and postterm infants (13.6%).

Lastly, maternal morbidity during pregnancy was also significantly related to the occurrence of BBLR (p-value = 0.029). Mothers with hypertension had the highest incidence of BBLR (63.6%), followed by those with anemia (18.2%) and DMG (18.2%).

In conclusion, the study found significant associations between maternal age, parity, gestational age, and maternal health conditions with the incidence of BBLR. These findings underscore the importance of these factors in predicting the risk of low birth weight and emphasize the need for appropriate medical interventions to improve maternal and neonatal outcomes at RS. Dr. M. Djamil Padang.

IV. DISCUSSION

Frequency Distribution of Low Birth Weight (LBW) at RS. DR. M. Djamil Padang

The study revealed that 37.9% of babies had Low Birth Weight (LBW), 32.8% had Very Low Birth Weight (VLBW), and 29.3% had Extremely Low Birth Weight (ELBW). These high rates suggest a significant number of premature births, intrauterine growth restrictions (IUGR), or maternal complications affecting fetal growth. Factors such as maternal age, parity, and nutritional status were found to contribute to LBW (Yuwana, 2022; Ningtyas et al., 2025). VLBW and ELBW pose serious health risks, including infections, respiratory issues, and developmental delays (Fitriyani, 2019). Anemia, preeclampsia, and placental issues further increase LBW risk (Ningtyas et al., 2025). Preventive measures such as regular prenatal check-ups, proper nutrition, and early intervention for health conditions are essential to reducing LBW incidence (Fitriyani, 2019).

Frequency Distribution of Maternal Age with LBW Babies at RS. DR. M. Djamil Padang

Data shows 36.2% of pregnant women were in both the very young (<20 years) and very old (>35 years) age groups, indicating a significant proportion outside the ideal age range (20-35 years). Pregnancies at extreme ages carry higher risks for complications like anemia, preterm labor, and LBW (Suparti & Fauziah, 2020; Rangkuti & Harahap, 2020). Women over 35 are more prone to chromosomal abnormalities, gestational diabetes, and nutrient deficiencies affecting fetal development (Octaviana & Indrasari, 2021; Figuelireldo et al., 2022). Both age extremes also result in lower mental readiness, influencing pregnancy care quality (Muliatul Jannah et al., 2021). These findings stress the need for targeted education and monitoring for pregnant women outside the ideal age range (Suparti & Fauziah, 2020).

Frequency Distribution of Parity of Mothers with LBW Babies at RS. DR. M. Djamil Padang

Out of 58 respondents, 37.9% were primiparous, 31.0% were multiparous, and 31.0% were grandmultiparous. Parity influences the risk of low birth weight (LBW), with both primiparous and grandmultiparous mothers at increased risk. Primiparous mothers often face challenges such as limited knowledge about pregnancy care, which contributes to a higher risk of LBW. Grandmultiparous mothers, due to uterine changes after multiple pregnancies, also have an elevated risk of LBW, as their uterine structure and placenta function may be compromised (Sohimah, 2023; Tonasih et al., 2020).

Frequency Distribution of Gestational Age of Mothers with LBW Babies at RS. DR. M. Djamil Padang

The study found that 41.4% of respondents had preterm deliveries. Preterm birth is a significant risk factor for LBW due to underdeveloped fetal organs. Factors like anemia and preeclampsia contribute to preterm delivery, as shown by Belumaputra et al. (2024) and Winasih (2021). Gestational age—whether preterm or postterm—affects LBW, with preterm births leading to inadequate fetal growth, and postterm births often causing placental insufficiency (Belumaputra et al., 2024).

Frequency Distribution of Maternal Morbidity in Pregnancy with LBW Babies at RS. DR. M. Djamil Padang

Hypertension, anemia, and gestational diabetes mellitus (GDM) were prevalent maternal complications. Hypertension, including preeclampsia, disrupts blood flow to the placenta, increasing LBW risk (Akib et al., 2024; Syafira, 2021). Anemia reduces oxygen delivery to the fetus, impairing growth (Salsabil, 2021), while GDM, particularly when poorly controlled, contributes to LBW through associated complications like preeclampsia and metabolic disturbances (Suhaili, 2023). Effective management of these conditions is essential to reduce LBW risks.

Frequency Distribution of Apgar Scores in LBW Babies at RS. DR. M. Djamil Padang

The study found that 43.1% of LBW babies had severe asphyxia, 36.2% had moderate asphyxia, and 20.7% had normal Apgar scores. Low Apgar scores are commonly seen in LBW babies, with respiratory distress being a key factor. Raharjo et al. (2021) found that prolonged labor and maternal conditions correlate with lower Apgar scores, while Selptimar et al. (2020) suggested that maternal nutritional status also plays a role in Apgar scores.

Frequency Distribution of Care Spaces for LBW Babies at RS. DR. M. Djamil Padang

The majority of LBW babies, 82.8%, were treated in the NICU, 13.8% in the SCN, and 3.4% underwent rooming-in. NICU care is essential for LBW babies due to the risks of hypothermia, hypoglycemia, and respiratory distress (Wahyuni et al., 2021). Babies with low Apgar scores are more likely to need NICU care for oxygen therapy and continuous monitoring (Seltiawan, 2023, Vanessa et al, 2022).

Frequency Distribution of Associated Diseases in LBW Babies at RS. DR. M. Djamil Padang

Neonatal asphyxia was present in 79.3% of LBW babies, followed by neonatal sepsis (13.8%) and neonatal pneumonia (6.9%). Asphyxia, a leading cause of neonatal mortality, is often due to prematurity and delivery complications (Fitriani et al., 2021). Pneumonia and sepsis, primarily caused by infections, are also significant risks for LBW babies (Widodo et al., 2022; Rahmadani et al., 2022).

Frequency Distribution of Discharge Status of LBW Babies at RS. DR. M. Djamil Padang
60.3% of LBW babies did not survive, while 39.7% were discharged alive. This high mortality rate is linked to prematurity, delivery complications, and associated diseases. LBW is a significant risk factor for infant mortality (Nengsih, 2016). Addressing maternal health and providing optimal care can reduce these risks.

The Relationship Between Maternal Age and the Incidence of Low Birth Weight Babies at RS. DR. M. Djamil Padang in 2023-2024
The bivariate analysis results (p-value = 0.018) show a significant relationship between maternal age and Low Birth Weight (LBW). Mothers who are too young (<20 years) have the highest incidence of LBW (50%), while older mothers (>35 years) have a higher incidence of Very Low Birth Weight (VLBW) and Extremely Low Birth Weight (ELBW), with rates of 47.4% and 58.8%, respectively. These findings align with studies by Widowati et al. (2024) and Sari et al. (2023), which found that both very young and older maternal ages increase LBW risk. Physiologically, younger mothers may face underdeveloped reproductive systems, while older mothers have higher risks of pregnancy complications like preeclampsia, which can impair fetal growth. Proper nutrition and medical care are essential for managing LBW risks across all age groups.

The Relationship Between Parity and the Incidence of Low Birth Weight Babies at RS. DR. M. Djamil Padang in 2023-2024
The bivariate analysis results (p-value = 0.028) reveal that maternal parity is significantly related to LBW. Primiparous mothers (first-time mothers) have the highest LBW rates (63.6%), while multiparous mothers have a lower incidence (22.7%), and grandmultiparous mothers (five or more pregnancies) show the highest rate of ELBW (47.1%). These results are consistent with studies by Widiastuti et al. (2019) and Ritonga (2020), which indicate that high parity is a risk factor for LBW. The higher risk in primiparous mothers may be due to a lack of awareness of proper nutrition and prenatal care, while grandmultiparous mothers may suffer from maternal depletion and pregnancy-related complications. Factors such as uterine damage, short pregnancy intervals, and health issues like anemia also contribute to the risk of LBW in multiparous mothers. Proper antenatal care, family planning, and nutrition are key to minimizing LBW risks.

The Relationship Between Maternal Gestational Age and the Incidence of Low Birth Weight Babies at RS. DR. M. Djamil Padang in 2023-2024
The bivariate analysis results (p-value = 0.024) show that gestational age is significantly linked to Low Birth Weight (LBW) at RS. DR. M. Djamil Padang. Preterm births have the highest percentage of LBW babies (68.2%), while full-term and postterm births show lower LBW rates (18.2% and 13.6%, respectively). However, Very Low Birth Weight (VLBW) is more common among full-term and postterm mothers (36.8%) than preterm mothers (26.3%), and Extremely Low Birth Weight (ELBW) is most prevalent in postterm pregnancies (47.1%).
These findings align with studies by Widowati et al. (2024) and Beltalia (2020), which emphasize that preterm deliveries are major contributors to LBW. Additionally, complications like Intrauterine Growth Restriction (IUGR) and preeclampsia in full-term and postterm pregnancies can also result in LBW. Managing these conditions early is essential to reducing LBW risks.

The Relationship Between Maternal Morbidity During Pregnancy and the Incidence of Low Birth Weight Babies at RS. DR. M. Djamil Padang in 2023-2024
The study (p-value = 0.029) found significant links between maternal morbidity during pregnancy and LBW. Hypertension, anemia, and gestational diabetes mellitus (GDM) were associated with higher LBW rates. Hypertension during pregnancy (63.6%) and anemia (47.4%) were major

contributors to LBW, while GDM led to the highest percentage of Extremely Low Birth Weight (ELBW) (47.1%).

These results are consistent with studies by Trisia et al. (2023) and Hudayah (2020), showing that hypertension and anemia significantly increase LBW risk. Proper management of these conditions is critical to reducing LBW and ensuring healthier outcomes for both mothers and babies.

V. CONCLUSION

Based on the study conducted at RS. DR. M. Djamil Padang from 2023 to 2024, it was found that a significant number of infants born with Low Birth Weight (LBW) were delivered by mothers who were either too young or too old, with most of these mothers being primiparous. The majority of LBW cases were found in infants born to mothers with preterm gestational ages. Hypertension during pregnancy was the most common maternal morbidity observed, followed by anemia and gestational diabetes mellitus (GDM). As a result, most of these infants had low Apgar scores, with asphyxia being the most common condition observed in LBW infants. Many of these infants required intensive care in the NICU, and asphyxia was the most frequent comorbidity.

Furthermore, the study revealed a significant relationship between maternal age and the incidence of LBW, with both very young and advanced maternal age being associated with an increased risk. Maternal parity also played a significant role, as first-time mothers (primiparas) had a higher likelihood of delivering LBW infants. Gestational age was another crucial factor, with preterm births being strongly linked to a higher incidence of LBW. Additionally, maternal morbidities such as hypertension, anemia, and GDM significantly contributed to the occurrence of LBW infants at RS. DR. M. Djamil Padang during the study period.

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Fitrayeni Fitrayeni, S.KM, M.Biomed is a lecturer serving as an Assistant Expert in the Midwifery Unit, Faculty of Medicine, Andalas University. She is a civil servant (PNS) with the rank of Penata Muda Tingkat I (III/b). Fitrayeni earned her bachelor's degree in Public Health (S.KM) from Andalas University in 2004 and completed her master's degree in Biomedical Sciences (M.Biomed) at the same university in 2009.