



THE RELATIONSHIP BETWEEN UPPER ARM CIRCUMFERENCE AND THE INCIDENCE OF ANEMIA IN PREGNANT WOMEN AND THE WEIGHT OF BIRTHED BABY AT MUHAMMADIYAH HOSPITAL, MEDAN

Dinda Assyura Alkhair^{1*}, & Amelia Eka Damayanti²

¹Pendidikan Dokter, Fakultas Kedokteran,
Universitas Muhammadiyah Sumatera Utara, Medan, Indonesia

²Departemen Gizi, Fakultas Kedokteran,
Universitas Muhammadiyah Sumatera Utara, Medan, Indonesia

*e-mail: dindaalkhair@gmail.com

Submit Tgl: 01-September-2026 Diterima Tgl: 19-September-2026 Diterbitkan Tgl: 26-September-2026

Abstrak: Pendahuluan: Kehamilan merupakan periode ketika janin berkembang di dalam rahim ibu. Selama kehamilan, tubuh ibu mengalami berbagai perubahan fisiologis untuk mendukung pertumbuhan dan perkembangan janin serta mempersiapkan ibu menghadapi persalinan dan menyusui. Oleh karena itu, kebutuhan gizi ibu hamil lebih besar dibandingkan dengan perempuan pada umumnya. Gizi memiliki peranan penting selama kehamilan karena berpengaruh terhadap kesehatan ibu dan janin. Asupan gizi yang tidak memadai dapat meningkatkan risiko anemia pada ibu hamil serta risiko melahirkan bayi dengan berat badan lahir rendah (BBLR). Lingkar Lengan Atas (LiLA) merupakan salah satu metode antropometri yang dapat digunakan untuk menilai status gizi ibu hamil. **Tujuan:** Mengetahui hubungan antara Lingkar Lengan Atas (LiLA) dengan kejadian anemia pada ibu hamil dan berat badan lahir bayi di RSU Muhammadiyah Medan. **Metode:** Penelitian ini merupakan penelitian analitik observasional dengan desain *cross-sectional*. **Hasil:** Ibu hamil yang mengalami anemia berjumlah 37 orang (74%), sedangkan yang tidak mengalami anemia berjumlah 13 orang (26%). Bayi yang lahir dengan berat badan normal berjumlah 45 orang (90%), sedangkan bayi dengan berat badan lahir rendah (BBLR) berjumlah 5 orang (10%). Ibu hamil dengan LiLA normal merupakan kelompok terbanyak, yaitu 40 orang (80%), sedangkan ibu hamil dengan LiLA yang berisiko mengalami Kekurangan Energi Kronis (KEK) berjumlah 10 orang (20%). **Kesimpulan:** Terdapat hubungan yang signifikan antara Lingkar Lengan Atas (LiLA) dengan kejadian anemia pada ibu hamil ($p = 0,046$) dan terdapat hubungan yang signifikan antara Lingkar Lengan Atas (LiLA) dengan berat badan lahir bayi ($p = 0,048$) pada ibu hamil di RSU Muhammadiyah Medan.

Kata Kunci: Ibu Hamil, Status Gizi, Lingkar Lengan Atas (Lila), Anemia, Berat Badan Lahir.

Abstrak: Introduction: Pregnancy is a period in which the fetus develops in the mother's womb. During pregnancy, the mother's body undergoes many physiological changes to allow for fetal growth and to prepare the mother for childbirth and lactation. Therefore, the nutritional needs of pregnant women are greater than the nutritional needs of women in general. Nutrition plays an important role during pregnancy for the health of the mother and fetus. Lack of adequate nutritional intake can put someone at risk of anemia during pregnancy and the risk of giving birth to a baby with low birth weight (LBW). Upper Arm Circumference (LiLa) is one of the anthropometric methods that is useful for assessing nutritional status in pregnant women. **Objective:** To determine the relationship between upper arm circumference and the incidence of anemia in pregnant women and birth weight of babies at Muhammadiyah Medan Hospital. **Method:** This study is an observational analytical study, applying a cross-sectional research

method. **Results:** Pregnant women with anemia were 37 people (74%), and pregnant women who were not anemic were only 13 people (26%). Babies born with normal weight were 45 people (90%), while babies with low birth weight were only 5 people (10%). Pregnant women with normal upper arm circumference were the most, namely 40 people (80%), while pregnant women with upper arm circumference at risk of chronic energy deficiency were only 10 people (20%). **Conclusion:** There is a significant relationship between upper arm circumference (LiLa) and anemia ($p = 0.046$) and there is a significant relationship between upper arm circumference (LiLa) and birth weight ($p = 0.048$) in pregnant women at RSU Muhammadiyah Medan.

Keywords: Pregnant Women, Nutritional Status, Upper Arm Circumference, Anemia, Birth Weight.

How to Cite Alkhair, D. A., & Damayanti, A. E. (2026). The Relationship Between Upper Arm Circumference and the Incidence of Anemia in Pregnant Women and the Weight of Birthed Baby at Muhammadiyah Hospital, Medan. *JIKES: Jurnal Ilmu Kesehatan*, 5(1), 1000–1006. <https://doi.org/10.71456/jik.v5i1.2659>

INTRODUCTION

Pregnancy is a process that involves physiological changes. During pregnancy, the mother's body undergoes numerous physiological changes to facilitate fetal growth and prepare for childbirth and lactation. Therefore, the nutritional needs of pregnant women are greater than those of women in general. Assessing nutritional status during pregnancy is crucial in prenatal care to ensure optimal health for both the fetus and mother (Harjatmo et al., 2023; Indriyani et al., 2023; Maqbool et al., 2019).

One of the most commonly used anthropometric methods to assess nutritional status is mid-upper arm circumference (MIC). Mid-upper arm circumference (UMC) is a useful alternative to body mass index (BMI) due to its low cost and shorter measurement time. Good nutritional status in pregnant women is indicated by an IMC of at least 23.5 cm (Indriyani et al., 2023; Salih et al., 2023; Amari Nurliwayka Qodri et al., 2024).

One of the problems that can occur during pregnancy related to nutritional status is anemia. Anemia in pregnant women is a national health problem and has been linked to poor fetal outcomes. Anemia, particularly iron deficiency anemia, has been considered a major public health problem, particularly in pregnant women (Maqbool et al., 2019).

The global prevalence of anemia is reported to be 55.9% among pregnant women. The prevalence of anemia among pregnant women in Indonesia is relatively high, reaching 48.9%. Anemia is one of the problems caused by inadequate nutrition (Eweis et al., 2021; Rizki Fauzan Moh & Kaseger, 2022).

Anemia in pregnant women can be caused by iron (Fe) deficiency. Insufficient iron consumption can reduce hemoglobin (Hb) levels in the blood of pregnant women, which causes blood flow to the fetus to be obstructed and disrupts the flow of oxygen and nutrient supply from the mother to the fetus. This will inhibit fetal growth and hamper fetal weight gain. Anemia in pregnancy causes impaired oxygenation and nutrient supply from the mother to the fetus. As a result, the fetus will experience impaired weight gain, resulting in Low Birth Weight (LBW). Anemia can lead to premature birth and LBW, and increases the risk of mortality and morbidity for both the mother and the fetus (Maqbool et al., 2019; Kasmayani et al., 2022; Indriyani et al., 2023).

Mothers who do not receive adequate nutritional intake during pregnancy can result in anemia in the mother and cause the baby to be born with low birth weight (LBW).

According to the WHO, a baby's birth weight is classified as low birth weight if the birth weight is <2500 grams. Low birth weight can be caused by several factors, namely maternal factors, fetal factors, placental factors, and environmental factors. The proportion of pregnant women who experience anemia has a significant relationship with several factors that influence the incidence of anemia. Factors that influence the relationship between pregnant women and anemia include hemoglobin levels in pregnant women, consumption of Fe tablets, nutritional status, and infection (World Health Organization [WHO], 2024; Adelia & Rohmah, 2023; Kolifah et al., 2023).

METHOD

This research method is an observational analytical study with a cross-sectional design where researchers observe and analyze between variables, namely upper arm circumference with the incidence of anemia in pregnant women and birth weight of babies. The study aims to determine the correlation or relationship between upper arm circumference with the incidence of anemia in pregnant women and birth weight of babies at Muhammadiyah General Hospital, Medan. This study was conducted at Muhammadiyah General Hospital, Medan in January-February 2025. The population in this study were all women who received antenatal care at Muhammadiyah General Hospital, Medan, who gave birth in the period January-February 2025, which had been recorded in the medical record, a total of 67 people. The research sample taken in this study were all pregnant women who received antenatal care at Muhammadiyah General Hospital, Medan, who gave birth in the period January-February 2025 who met the inclusion and exclusion criteria. The sampling method used a total sampling technique. According to Sugiyono in 2021, if the population size is relatively small, then total sampling can be used to take samples. Researchers took 50 respondents who met the inclusion criteria.

Data was taken from medical records and upper arm circumference (LILA) measurements of pregnant women during the period January-February 2025 who underwent *antenatal care* at Muhammadiyah General Hospital Medan.

The collected data will be tabulated and arranged using a frequency distribution table. The data will be analyzed using SPSS to determine the relationship between the two variables. *independent* and dependent with Chi square analysis test.

RESULTS AND DISCUSSION

The results of this study were obtained through mid-upper arm circumference (MIC) measurements and medical records. The results followed inclusion and exclusion criteria, with inclusion criteria being singleton pregnant women aged 20-35 years, women with term pregnancies, and women in their third trimester. On the other hand, exclusion criteria used in this study were women with multiple pregnancies, women with a history of illness or complications during pregnancy, pregnant women with a history of smoking or drinking alcohol, women with chronic diseases, and incomplete medical records.

Univariate Analysis

Table 1. Characteristics of pregnant women at Muhammadiyah Medan Hospital

Characteristics	n	%
Age		
20-35 years	44	88.0
<20 years or >35 years	6	12.0
Total	50	100.0
The occurrence of anemia		
anemia	37	74.0
not anemic	13	26.0
Total	50	100.0
Baby's birth weight		
low	5	10.0
normal	45	90.0
Total	50	100.0
LiLa (upper arm circumference)		
normal	40	80.0
KEK risk	10	20.0
Total	50	100.0

The age characteristics of pregnant women at Muhammadiyah Medan Hospital are dominated by 44 (88%) aged 20-35 years, with only 6 (12%) pregnant women aged <20 years or >35 years. 37 (74%) pregnant women experienced anemia, while only 13 (26%) pregnant women were not anemic. 45 (90%) babies were born with normal birth weight, while only 5 (10%) babies had low birth weight. 40 (80%) pregnant women had a normal upper arm circumference, while only 10 (20%) pregnant women had an upper arm circumference at risk of KEK.

Bivariate Analysis

Table 2. The relationship between upper arm circumference and the incidence of anemia in pregnant women

LiLa	The occurrence of anemia						<i>p-value</i>
	No Anemia		Anemia		Total		
	n	%	n	%	n	%	
Normal	13	32.5	27	67.5	40	100.0	0.046*
SEZ Risks	0	0	10	100.0	10	100.0	
Total	13	26.0	37	74.0	50	100.0	

The relationship between upper arm circumference and the incidence of anemia in pregnant women was measured using the Fisher exact test analysis in the SPSS application. A p-value <0.05 can be interpreted as a significant relationship between upper arm circumference and the incidence of anemia in pregnant women at Muhammadiyah General Hospital, Medan.

Table 3. Relationship between upper arm circumference and birth weight

Table 5: Relationship between upper arm circumference and birth weight							
LiLa	Birth weight of baby						<i>p-value</i>
	Normal		Low		Total		
	n	%	n	%	n	%	
Normal	38	95	2	5	40	100.0	0.048*
SEZ Risks	7	70.0	3	30.0	10	100.0	
Total	45	90.0	5	10.0	50	100.0	

The relationship between upper arm circumference and birth weight was measured using the Fisher exact test in the SPSS application. A *p*-value of <0.05 can be interpreted as a significant relationship between upper arm circumference and birth weight at Muhammadiyah General Hospital, Medan.

DISCUSSION

The results of this study indicate that the majority of pregnant women in their third trimester experience anemia. This may be due to increased iron requirements during the third trimester. The third trimester of pregnancy can cause anemia due to several factors, such as increased iron requirements during the third trimester. This increased iron requirement occurs due to hemodilution. Hemodilution can increase blood volume, but erythrocytes experience a smaller increase than blood plasma, resulting in decreased hematocrit and hemoglobin concentrations during pregnancy. Thus, reduced hemoglobin levels can cause anemia in pregnant women. The results of this study align with previous studies, such as Eweis in 2021, which found that the majority of pregnant women in their third trimester experience anemia (Eweis et al., 2021; Arfan, 2024; Eka Fadillah Bagenda et al., 2022).

The results of this study indicate a correlation ($p < 0.05$) between LiLa and the incidence of anemia in pregnant women. This is consistent with previous research showing a significant association between LiLA size and the incidence of anemia (Eka Fadillah Bagenda et al., 2022).

An abnormal upper arm circumference (MUC), particularly one that indicates a risk of Chronic Energy Deficiency (CED), can cause anemia in pregnant women due to several factors, including nutritional deficiencies. A MUC of less than 23.5 cm indicates that the pregnant woman may be experiencing calorie and protein deficiencies. This malnutrition can disrupt red blood cell production and hemoglobin synthesis, which is needed to transport oxygen in the blood. Nutrient deficiencies such as iron, folic acid, and vitamin B12 are essential for blood formation and thus contribute to anemia. The impact of malnutrition on health leads to decreased health, including anemia in the mother. Hemoglobin production factors: pregnant women with an abnormal MUC tend to have an inadequate nutrient supply for hemoglobin formation, resulting in anemia. In previous research, it was found that 17.3% of pregnant women are at risk of CED, which results in anemia (Bekele et al., 2024).

The results of this study indicate a relationship ($p < 0.05$) between LiLA and birth weight. This aligns with Aryaneta's 2021 study, which demonstrated a relationship between LiLA size and birth weight (Aryaneta & Silalahi, 2021).

Pregnant women with CED are considered high-risk because it can disrupt various physiological processes closely related to fetal growth and development. Babies born to mothers with CED often have low birth weight, short stature, and small head circumference. This condition increases the risk of health complications in the baby, such as breathing difficulties, hypothermia, and infection (Shi et al., 2021).

This study has limitations. This limitation is the relatively small sample size, which is due to the short research period, January-February 2025.

CONCLUSION

Based on the research conducted, it was concluded that the majority of pregnant women experienced anemia as much as 74%, the majority of babies born at Muhammadiyah Medan Hospital had normal weight, and the majority of pregnant women had a normal upper arm circumference, namely 80%. In addition, there was a relationship between upper arm circumference with the incidence of anemia in pregnant women and birth weight of babies at Muhammadiyah Medan Hospital with a p value <0.05.

BIBLIOGRAPHY

- Adelia, D., & Rohmah, F. (2023). The relationship between upper arm circumference (LiLA) and hemoglobin levels of pregnant women with LBW cases at Panembahan Senopati Hospital of Bantul. *Menara Journal of Health Science*, 2(1), 68–78.
- Arfan, I. (2024). The risk factors for anemia in women at third trimester of pregnancy in the Primary Health Center of Tanjung Sekayam: A case-control study. *Amerta Nutrition*, 8(1), 37–44.
- Aryaneta, Y., & Silalahi, R. D. (2021). Hubungan antara lingkar lengan atas (LiLA) dengan berat bayi lahir di wilayah kerja Pusat Kesehatan Masyarakat Sei Langkai (Puskesmas) Kota Batam tahun 2019. *Menara Ilmu*, 15(2). <https://doi.org/10.31869/mi.v15i2.2412>
- Bekele, Y., Gallagher, C., Batra, M., Vicendese, D., Buultjens, M., & Bircan Erbas. (2024). Is oral iron and folate supplementation during pregnancy protective against low birth weight and preterm birth in Africa? A systematic review and meta-analysis. *Nutrients*, 16(16), 2801. <https://doi.org/10.3390/nu16162801>
- Eka Fadillah Bagenda, Oka, I. A., & Sri Devi Syamsuddin. (2022). Hubungan lingkar lengan atas (LiLA) dengan kejadian anemia pada ibu hamil di wilayah kerja Puskesmas Tallunglipu tahun 2021. *Maternal and Neonatal Health Journal*, 3(2), 99–103. <https://doi.org/10.37010/mnhj.v3i2.835>
- Eweis, M., Farid, E. Z., El-Malky, N., Abdel-Rasheed, M., Salem, S., & Shawky, S. (2021). Prevalence and determinants of anemia during the third trimester of pregnancy. *Clinical Nutrition ESPEN*, 44, 194–199. <https://doi.org/10.1016/j.clnesp.2021.06.023>
- Harjatmo, P. T., Wanda Yulieta, T., Darmawan, S., Wiyono, S., Regita Nareswara, A., & Nugroho, A. (2023). Overview of mother's body mass index (BMI) before pregnancy, weight gain, upper arm circumference, and hemoglobin levels during pregnancy, and baby birth weight at the Cilandak District Health Center. *SANITAS: Jurnal Teknologi dan Seni Kesehatan*, 14(1), 11–21. <https://doi.org/10.36525/sanitas.2023.2>
- Indriyani, Tiara Oktariza, R., Noviyanti, & Aurel Virginia, J. (2023). Mid-upper arm circumference in pregnant women and its correlation to birth weight. *Muhammadiyah Medical Journal*, 4(1), 32–38. <https://doi.org/10.24853/mmj.4.1>

- Kasmayani, Mawarni, M., & Adeliana. (2022). Hubungan status gizi ibu hamil trimester I dengan anemia di Pustu Tobadak tahun 2021. *Jurnal Ilmiah Kesehatan Diagnosis*, 17(3), 89–93.
- Kolifah, Srirahandayani, D., & Prihartanti, N. G. (2023). The influence of hemoglobin levels and nutritional status of first-trimester pregnant woman with low birth weight. *Jurnal Kesehatan Komunitas Indonesia*, 3(3), 340–352. <https://doi.org/10.58545/jkki.v3i3.50>
- Maqbool, M., Amin Dar, M., Gani, I., & Mir, S. (2019). Maternal health and nutrition in pregnancy: An insight. *World Journal of Pharmacy and Pharmaceutical Sciences*, 8(3), 450–459. <https://doi.org/10.20959/wjpps20193-13290>
- Qodri, A. N., Sari, W., Trijayanthi Utama, W., & Oktafany, O. (2024). LiLA dan anemia defisiensi besi pada ibu hamil dengan kejadian BBLR. *Action Research Literate*, 8(3). <https://doi.org/10.46799/ar1.v8i3.249>
- Salih, Y., Omar, S. M., AlHabardi, N., & Adam, I. (2023). The mid-upper arm circumference as a substitute for body mass index in the assessment of nutritional status among pregnant women: A cross-sectional study. *Medicina*, 59(6), 1001. <https://doi.org/10.3390/medicina59061001>
- Shi, G., Zhang, Z., Ma, L., Zhang, B., Dang, S., & Yan, H. (2021). Association between maternal iron supplementation and newborn birth weight: A quantile regression analysis. *Italian Journal of Pediatrics*, 47(1). <https://doi.org/10.1186/s13052-021-01084-7>
- World Health Organization. (2024). *Low birth weight*. <https://www.who.int/data/nutrition/nlis/info/low-birth-weight>