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The Change in Hemoglobin Levels Before and After Cesarean Section and its Association with Age and Parity in Pregnant Women at Yarsi Hospital from January to October 2025 and Its Review According to Islam

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Abstract
This research aimed to analyze changes in hemoglobin levels before and after cesarean section and their association with maternal age and parity in pregnant women at YARSI Hospital from January to October 2025, as well as to review cesarean section from an Islamic perspective. This study employed a descriptive analytic design with a retrospective approach using secondary data obtained from medical records. A total of 292 pregnant women who underwent cesarean section and met the inclusion criteria were selected through consecutive sampling. Data analysis included univariate and bivariate analyses, using a paired t-test to assess differences in hemoglobin levels before and after cesarean section and a chi-square test to examine the relationship between age, parity, and changes in hemoglobin levels. The results showed that the mean hemoglobin level before cesarean section was 11.67 g/dL and after cesarean section was 11.78 g/dL, with no statistically significant difference between the two measurements. Furthermore, there was no significant association between maternal age or parity and changes in hemoglobin levels. From an Islamic perspective, cesarean section is permissible as it aligns with the principle of *Hifz al-Nafs* (protection of life) within *Maqasid Shari'ah*, provided it is performed based on medical indications and aims to prevent harm to the mother and fetus. In conclusion, cesarean section at YARSI Hospital did not result in significant changes in hemoglobin levels and was not influenced by maternal age or parity, while remaining consistent with Islamic medical ethics.

INTRODUCTION

Hemoglobin (Hb) acts as an oxygen carrier and ensures the distribution of oxygen to all body tissue cells (Ministry of Health of the Republic of Indonesia, 2023). During pregnancy, a significant increase in plasma volume leads to a decrease in hemoglobin concentration. As a result, overall blood viscosity decreases (Sikoway et al., 2020).

During pregnancy, women generally experience hemodilution, a physiological adjustment characterized by a greater increase in plasma volume than in the number of erythrocytes. Plasma volume increases by about 30–40%, with a peak at 32–34 weeks of gestation, resulting in blood dilution (Mujahadatuljannah and Rabiatunnisa, 2024). Therefore, optimal Hb levels are very important to prevent complications such as anemia and to support the mother's healing process (Devi, Yanti, & Prihatiningsih, 2023).

Labor is defined as the onset of regular uterine activity, cervical effacement and dilation, accompanied by the descent of the presenting part (Layden, Thomson, Owen, Madhra, & Magowan, 2022). The method of delivery can occur in two ways: vaginal delivery and operative delivery. Vaginal delivery is the process of giving birth through the vagina. During childbirth, the vaginal muscles stretch and widen to allow the baby to pass (Indryani, 2024). In addition, delivery may be performed through a surgical procedure known as sectio caesarea

(SC). Sectio caesarea is the birth of a fetus through surgical incisions in the mother's abdomen and uterus. This method is chosen when vaginal delivery is impossible, impractical, or unsafe for the mother or baby (Netter, 2024).

Sectio caesarea is performed with consideration of medical risks, including excessive bleeding, wound infection, thromboembolism, and injury to adjacent organs (Indryani, 2024). It is a major surgical procedure, with a maternal mortality rate approximately three to four times higher than that of vaginal delivery (Netter, 2024). Postpartum hemorrhage is the leading cause of maternal mortality worldwide. Each year, about 14 million women experience postpartum hemorrhage, resulting in approximately 70,000 maternal deaths globally (World Health Organization, 2023).

Several studies have explored the impact of C-sections on hemoglobin levels, with varying findings regarding physiological changes in blood parameters before and after surgery. Research by Abdelazim et al. (2021) and Baktiyani (2020) found no significant changes in hemoglobin levels before and after C-section, consistent with the findings of this study. However, studies by Qunaiti and Ismawatie (2024) and Triani (2023) reported differences in hemoglobin levels, suggesting that the degree of blood loss, intraoperative complications, and postoperative care may influence these outcomes.

Postpartum hemorrhage is considered significant when blood loss exceeds 500 mL after vaginal delivery or 1,000 mL after sectio caesarea (Indonesian Obstetrics and Gynecology Association, 2016). Primary postpartum hemorrhage occurs within 24 hours of delivery, while secondary postpartum hemorrhage occurs up to 12 weeks postpartum (Wormer, Jamil, and Bryant, 2024).

Factors affecting changes in hemoglobin levels in sectio caesarea are diverse, including maternal age and parity. Pregnancy at a very young or advanced age (≤20 years or ≥35 years) increases the risk of complications (Yadhy, Kusumajaya, and Mardiana, 2023). Mothers with high parity, particularly those with parity I or ≥IV, have a greater risk of complications affecting both the mother and fetus (Amir, 2020).

YARSI Hospital is one of the hospitals in Jakarta that provides delivery services for pregnant women, including the sectio caesarea method. Hemoglobin testing in pregnant women at YARSI Hospital is a mandatory examination before and after delivery. To date, there has been no research examining changes in hemoglobin levels before and after cesarean section and their relationship with maternal age and parity at YARSI Hospital.

In Islam, there is a concept of maqāṣid sharī'ah, proposed by Imam Al-Shatibi, which emphasizes that all provisions of Islamic law aim to realize human welfare, particularly in preserving five essential principles: religion, life, intellect, lineage, and property (Haryani, Rohmat, and Santoso, 2024). Safeguarding life (*ḥifẓ al-nafs*) holds a central position within the hierarchy of benefits, as it belongs to the level of ḍarūriyyāt that must be maintained for human survival (Diab, 2017).

In the context of maternal health, various obstetric conditions can pose risks to the safety of both mother and fetus; therefore, medical interventions such as sectio caesarea are justified to prevent morbidity and mortality (Cunningham et al., 2014). In line with the principles of sharī'ah, various schools of Islamic jurisprudence agree that a cesarean section is permissible when medically indicated to protect life (Beddu et al., 2024). Furthermore, medical ethics in Islam emphasizes respect for patient dignity, professionalism, and the prohibition of actions

that may cause harm to oneself or others (Tiara et al., 2025). Therefore, clinical decision-making related to sectio caesarea is based not only on medical considerations but also on the values of maqāṣid sharī'ah, which prioritize benefit and the prevention of harm (maḍarrah) (Diab, 2017).

Despite these studies, research on how maternal age and parity specifically influence hemoglobin changes in the context of cesarean section remains limited, particularly in Indonesia. This gap lies in the limited investigation of how age and parity interact with hemoglobin changes in pregnant women undergoing C-section, especially in local hospitals such as YARSI Hospital, Jakarta. Additionally, research integrating Islamic perspectives on medical practices, particularly in maternal health and cesarean section, is still lacking. According to maqāṣid sharī'ah, which emphasizes *ḥifẓ al-nafs* (protection of life), a cesarean section is permissible under medical necessity. However, no comprehensive study has examined the clinical implications of C-section in alignment with Islamic medical ethics.

Therefore, based on the background above, the researcher is interested in conducting a study titled "Changes in Hemoglobin Levels Before and After Sectio Caesarea and Its Relationship with Age and Parity in Pregnant Women at YARSI Hospital."

This research is motivated by the lack of data describing hemoglobin levels in pregnant women before and after the sectio caesarea procedure and their relationship with age and parity at YARSI Hospital. Accordingly, the research question addresses pre- and postoperative hemoglobin levels, the relationship between age and parity and changes in hemoglobin levels, as well as a review of sectio caesarea from an Islamic perspective based on maqāṣid sharī'ah, particularly in preserving life (*ḥifẓ al-nafs*), medical ethics, and the responsibilities of healthcare professionals. The general objective of this study is to determine the profile of hemoglobin levels before and after sectio caesarea and their relationship with age and parity in pregnant women at YARSI Hospital. The specific objectives include analyzing hemoglobin levels before and after the procedure, examining the relationship between age and parity and hemoglobin changes, and understanding Islamic perspectives on sectio caesarea. The results of this study are expected to benefit students by enhancing scientific knowledge, support YARSI University as an academic reference, assist researchers in fulfilling academic requirements and developing research skills, and provide healthcare institutions with considerations for preventing and managing complications related to cesarean section.

METHOD

This research was an analytical descriptive study that aimed to determine the difference in hemoglobin levels before and after sectio caesarea and its relationship with age and parity in pregnant women at YARSI Hospital. The research design used was descriptive and analytical with a retrospective approach, namely by examining medical record data of pregnant women who underwent cesarean section during the period from January to October 2025, so that changes in hemoglobin levels could be analyzed based on available data.

The population in this study consisted of all pregnant women who underwent sectio caesarea delivery at YARSI Hospital. The study sample was drawn from the population that met the inclusion criteria, namely pregnant women who underwent a cesarean section and had complete blood count results before and after the procedure. The exclusion criteria included pregnant women with severe medical illnesses, active bleeding before the procedure, and those

who had received blood transfusions prior to the cesarean section. The number of samples was determined using the Slovin formula with a margin of error of 5%, resulting in a minimum sample size of 292 participants.

The sampling technique used was non-probability sampling with a consecutive sampling method, in which all subjects who met the inclusion criteria were selected sequentially until the required sample size was reached. The data used were secondary data sourced from the medical records of pregnant women at YARSI Hospital. Data collection was carried out after obtaining permission from the hospital by recording demographic data, including age and parity, as well as hemoglobin levels before and after cesarean section in g/dL units, using medical record form instruments and complete blood count results.

Data analysis was conducted through univariate and bivariate analyses. Univariate analysis was used to describe respondent characteristics and the distribution of hemoglobin levels, while bivariate analysis was used to assess differences in hemoglobin levels before and after cesarean section, as well as the relationship between age and parity and changes in hemoglobin levels. A normality test was first performed to determine the appropriate statistical test to be used, with the paired t-test applied for normally distributed data and the chi-square test used to analyze relationships between variables. A significance level of 0.05 was used to test the established research hypothesis.

RESULT AND DISCUSSION

1. Distribution of pregnant women with sectio caesarea by age category and parity category

Based on the data obtained from the results of the study, the distribution of data on pregnant women who performed a cesarean section based on age and parity was obtained as follows:

Table 1. Based on age category and parity category

Variable	Category Age	Quantity (n)	Percentage (%)
Age (years)	< 20 years old	5	1,7%
	20-35 years old	245	83,9%
	>35 years old	42	14,4%
Total		292	100%
Parity	Nullipara (0)	86	29,5%
	Primipara (1)	130	44,5%
	Multipara (2-4)	76	26,0%
Total		292	100%

Source: Research Data at YARSI Hospital (2025)

Based on the results of table 1, it shows that the majority of pregnant women who performed a cesarean section were in the age category of 20-35 years as many as 245 people (83.9%), followed by the age category >35 years as many as 42 people (14.4%) and the age category <20 years of 5 people (1.7%). Meanwhile, based on the parity of pregnant women, the most parity category was in the primipara group of 130 people (44.5%), followed by the nullipara group of 86 people (29.5%) and the multipara group of 76 people (26.0%).

2. Overview of Hemoglobin Levels Before And After Sectio Caesarea (SC) In Pregnant Women

Based on the results of descriptive analysis of data on hemoglobin levels before sectio caesarea in pregnant women, the following results were obtained:

Table 2. Distribution of Hemoglobin Levels Before SC

	Mean	I 95%
Hb Rate Before	11,72g/dL	11,61 – 11,83g/dL

Source: Research Data at YARSI Hospital (2025)

Based on Table 2 above, the average Hb before SC is 11.72g/dL with a 95% confidence interval in the range of 11.61 – 11.83g/dL

Based on the results of the descriptive analysis of data on hemoglobin levels after sectio caesarea in pregnant women, the following results were obtained:

Table 3. Distribution of Hemoglobin Levels After SC

	Mean	I 95%
Hb Rate After	11,84g/dL	11,69 – 12,00g/dL

Source: Research Data at YARSI Hospital (2025)

Based on Table 3 above, the average Hb after SC is 11.84g/dL with a 95% confidence interval in the range of 11.69 – 12.00g/dL.

3. Changes in Hemoglobin Levels Before and After Sectio Caesarea

Based on the results of descriptive analysis of data on hemoglobin levels before and after sectio caesarea in pregnant women, the following results were obtained:

Table 4. Distribution of Hemoglobin Levels Change Before and After SC

Category Changes	Quantity (n)	Percentage (%)
Decrease	120	41,1%
No Change (Stable)	12	4,1%
Increase	160	54,8%
Total	**292**	**100%**

Source: Research Data at YARSI Hospital (2025)

Based on Table 4 above, it shows that out of 292 pregnant women who underwent SC, 160 pregnant women (54.8%) experienced an increase in hemoglobin levels. Meanwhile, 120 pregnant women (41.1%) experienced a decrease in hemoglobin levels and 12 other pregnant women (4.1%) did not experience any change in hemoglobin levels.

4. Normality Test

Normality tests need to be carried out before testing bivariate analysis to determine what type of bivariate test the research will use based on the data obtained whether it is normally distributed or abnormal.

Based on the researcher's data totaling 292, the researcher used the Kolmogorov-Smirnov normality test using the SPSS program version 29.0.0.0. The results of the normality test on the data of this study were obtained as follows:

Table 5. Normality Test of Hemoglobin Level Change Data Before and After SC

	Kolmogorov-Smirnov		
	Statistic	**df**	**Sig.**
Hb Change (Difference)	0,049	292	0,083

Source: Research Data at YARSI Hospital (2025)

Based on the results of the normality test above, a p-value of 0.083 (p >0.05) was obtained, which means that the research data is normally distributed.

5. Bivariate Statistical Analysis Test

Bivariate statistical tests were conducted to find out whether or not there is a relationship between dependent variables and independent variables in this study. Because the variable of hemoglobin change (difference) is normally distributed based on the normality test, the statistical analysis used is as follows:

1. Paired T Test to analyze changes in hemoglobin levels before and after cesarean section.
2. Pearson's Chi-Square to analyze the relationship between the age category and the parity category with the category of changes in hemoglobin levels (difference).

The results of the two tests above will be obtained with a p-value which if the p-value is obtained at p<0.05, then the research is considered meaningful. However, if the p-value is obtained at p>0.05, the research is considered meaningless.

Table 6. Paired T Test Results on Hemoglobin Levels Before and After Sectio Caesarea

	Mean (s.b)	**Difference (s.b)**	**I 95%**	**Value p**
Hb before	11,67 (1,08)	0,11 (1,10)	11,56 – 11,79	0,171
Hb after	11,78 (1,12)			

Source: Research Data at YARSI Hospital (2025)

Based on the test results in table 6, it is known that the value of p=0.171 (>0.05) means that there is no significant change between hemoglobin levels before and after SC so that H0 is accepted and H1 is rejected.

Table 7. Pearson's Chi-Square Analysis Results Between Ages and Changes in Hemoglobin Levels (Difference)

	Hb Change (Difference)				
	Stay + Rise		**Get Down**		**Value p**
	N	**%**	**N**	**%**	
Age <35 years old	149	59,6	101	40,4	0,555
Age >35 years old	23	54,8	19	45,2	
Total	**172**	**58,9**	**120**	**41,1**	

Source: Research Data at YARSI Hospital (2025)

Based on the test results in table 7 above, there is a merger of categories that originally had 3 groups into 2 groups, namely:

1. Age category: Age <20 years and range 20-35 years combined into one and >35 years fixed.
2. Hb Change Category: Fixed and ascending Hb combined into one and fixed descending Hb.

Therefore, the re-category was carried out to qualify for Chi-Square. After the merger, the results of the Chi-Square analysis became valid (0% expected count <5).

The results of the Chi-Square test showed that the p value was 0.555 (>0.05) which means that there was no significant relationship between the mother's age and changes in hemoglobin levels in pregnant women undergoing SC so that H0 was accepted and H1 was rejected.

Table 8. Pearson's Chi-Square Analysis Results Between Parity and Change in Hemoglobin Levels (Difference)

	Hb Change (Difference)				
	Stable + Increase		Decrease		Value
	N	%	n	%	p
Nullipara	44	51,2	42	48,8	
Primipara	81	62,3	49	37,7	0,221
Multipara	47	61,8	29	38,2	
Total	172	58,9	120	41,1	

Source: Research Data at YARSI Hospital (2025)

Based on the test results in table 8 above, there is a merger of categories that originally had 3 groups into 2 groups, namely:

1. Hb Change Category: Fixed and ascending Hb combined into one and fixed descending Hb.

Therefore, the re-category was carried out to qualify for Chi-Square. After the merger, the results of the Chi-Square analysis became valid (0% expected count <5).

The results of the Chi-Square test showed that the p value was 0.221 (>0.05) which means that there was no significant relationship between maternal parity and changes in hemoglobin levels in pregnant women undergoing SC so that H0 was accepted and H1 was rejected.

1. Distribution of Pregnant Women with Sectio Caesarea Based on Age Category and Parity Category

The majority of pregnant women who undergo cesarean section at this hospital are in the age group of 20-35 years as many as 245 people (83.9%). Meanwhile, in the age group > 35 years as many as 42 people (14.4%) and in the age group < 20 years as many as 5 people (1.7%). This shows that pregnant women who undergo cesarean section at this hospital are at a safe reproductive age.

These findings are in line with research conducted by Norbaiti et al. (2024) that the maternal age at the time of the study was the most, namely in the safe range for SC childbirth (20-35 years) as many as 211 respondents with a percentage of 59.9%. Meanwhile, the least data was in the age range of unsafe SC childbirth (<20 years and >35 years), which was as many as 141 respondents with a percentage of 40.1%.

The findings of this study are also in line with research conducted by Basri, Saimin and Lieswan (2025) that the age group of 20-35 years which is included in the low-risk category is the group with the highest number of SC actions. In the study, mothers aged 20-35 years were recorded as many as 89 cases (36.3%) of recurrent SC and 80 cases (32.7%) of primary SC, so that in total this group accounted for the largest proportion of SC actions. In contrast, at high-

risk ages (<20 and >35 years) only 59 cases (24.1%) of recurrent SC and 17 cases (6.9%) of primary SC were found (Basri, Saimin and Lieswan, 2025). This pattern supports the results of the study that the primary reproductive age (20–35 years) remains the group with the highest frequency of SC, both primary and recurrent.

The results of another study conducted by Tia et al. (2016) also support the results of this study which found that the age of patients who performed a cesarean section was the most in the age group of 20-35 years amounting to 23 people (71.9%) and followed by the age group >35 years with 9 people (28.1%). The high proportion of mothers who give birth by cesarean section in the age group of 20-35 years is the optimal reproductive age group for mothers to get pregnant and give birth (Tia, Kumaat and Lalenoh, 2016).

Research in Korea conducted by Kim, Oh and Yun (2023) shows that the birth rate through SC increases in all age groups, namely <25 years, 25–34 years, and ≥35 years. Despite the differences between age groups, the fastest increase occurred in the <25 and 25–34 age groups compared to the >35-year-old age group after the COVID-19 pandemic. In the 25–34 age group, the SC rate increased from 34.9% (2012) to 58.3% (2022). Meanwhile, in the <25-year-old group, there was an increase from 26.7% in 2012 to 51.6% in 2022 (Kim, Oh and Yun, 2023). This condition is in line with the results of this study, where the age group of 20-35 years is the group with the highest number of SC cases.

In a large study in Denmark conducted by Rydahl et al. (2019) that grouped the mother's age into <30 years, 30–35 years, 35–39 years, and ≥40 years, reported that the risk of SC began to increase in the 30–35 age group and continued to increase in the older age group, with the highest risk at ≥40 years of age (Rydahl et al., 2019). This difference is due to differences in population distribution and analysis approaches (risk and number of cases).

Research in the United States conducted by Kanjanakaew et al. (2024) showed that the SC rate was higher in the advanced maternal age (AMA) group (>35 years), which was 18.30%, compared to 15.10% in mothers aged <35 years. However, the study used an age category that was divided into only two groups, namely <35 years and ≥35 years old (Kanjanakaew et al., 2024). With such a grouping, all mothers aged 20–34 years are combined into the same group. In contrast, this study separated the ages of 20–35 years as a separate category, so that this group appeared to be the group with the highest number of SC cases. This difference in results is mainly due to differences in the way of age grouping.

Based on the amount of parity in pregnant women in this hospital, it was found that the most pregnant women who underwent caesarean section were the primipara group (1) as many as 130 people (44.5%), followed by the nullipara group (0) as many as 86 people (29.5%) and the multipara group as many as 76 people (26.0%). The maternal dominance at low parity suggests that many SC actions are performed on mothers with minimal childbirth experience.

The results of this study are supported by research conducted by Amir, F. (2020) which said that mothers with high parity who experience cesarean section are caused by parity I and IV which have a greater risk to the mother and also the fetus. Mothers who are giving birth for the first time are often mentally and psychologically unprepared, so this can increase the likelihood of complications and sectio caesarean sections. Meanwhile, mothers who give birth too often, the function of their reproductive organs deteriorates and the uterus will be weaker to contract and likely to experience major complications (Amir, 2020).

The findings of this study are also in line with research conducted by Norbaiti et al. (2024) that risk parity (parity 1 and >3) is the group with the highest number of SC actions, which is 52.8%, compared to non-risk parity (parity 2 and 3) of 47.2%. The high SC number at risk parity can be caused by the tendency of mothers with low parity, especially parity 1 who have not had previous childbirth experience. This unpreparedness for the delivery process increases the likelihood of complications, so the decision to perform SC is taken more often. In addition, parity >3 is also a risk group due to the increased obstetric complications that can arise from multiple pregnancies (Norbaiti et al., 2024).

Research in Saudi Arabia conducted by Alshammari et al. (2024) showed that multipara parity was the most common group undergoing a cesarean section with 112 people (46.1%) followed by primipara as many as 82 people (33.7%) (Alshammari et al., 2023).

2. Overview of Hemoglobin Levels in Pregnant Women With Sectio Caesarea (SC)

The description of hemoglobin levels obtained was obtained at the mean value of Hb before which was 11.72g/dL and Hb level after having a mean value of 11.84g/dL. The results of the Paired T test in table 4.6 show no significant change in the hemoglobin levels of pregnant women with sectio caesarea.

The results of this study are in line with the findings of research conducted by Sugiarto, Putra and Mitasari (2025) that there is no significant difference between pre and postpartum Hb levels between the normal delivery method and the sectio caesarean method. The absence of this difference may occur possibly because the handling of postpartum bleeding is in accordance with the National Guidelines for Medical Services prepared by the Indonesian Obstetrics and Gynecology Association (POGI) and the Maternal Fetal Medical Association (HKFM) so that the handling of bleeding in subjects during and after childbirth is carried out appropriately (Sugiarto, Putra and Mitasari, 2025).

Research in the Middle East conducted by Abdelazim, Farghali and Amer (2021) said that there was no significant difference between preoperative Hb levels and Hb levels immediately after surgery, 12 hours post-surgery, post-surgery, 48 hours post-surgery, or 1 week post-surgery. All p values > 0.05 indicate that changes in Hb post SC are minimal and clinically meaningless (Abdelazim, Farghali and Amer, 2021).

These findings are also in line with research conducted by Baktiyani (2020) that Hb levels before and after surgery do not have a meaningful relationship with the amount of intraoperative bleeding (Baktiyani, 2020).

This study is different from the findings conducted by Triani (2023) that there were differences in hemoglobin levels before and after Sectio Caesarea (SC) delivery at the Siti Khadijah Islamic Hospital, Palembang City in 2022 (Triani, 2023).

The research conducted by Qunaiti and Ismawatie (2024) is different from the findings of this study. Qunaiti and Ismawatie found that hemoglobin levels before and after SC obtained a p value (0.002), so it was concluded that there was a comparison of the average hemoglobin before and after SC (Qunaiti and Ismawatie, 2024).

Research conducted by Young et al. (2023) says that the mechanisms underlying the relationship between low maternal Hb and newborn are complex and multifactorial such as, nutritional deficiencies (e.g., iron, vitamin A, folic acid, or vitamin B12 deficiency), infections

(e.g., malaria, schistosomiasis, hookworm infections, HIV), hemoglobinopathy (sickle cell anemia, thalassaemia), and inflammation (Young et al., 2023).

It is estimated that about 75% of anemia in pregnancy is caused by iron deficiency. This iron deficiency can occur due to insufficient food intake, increased body needs, impaired iron absorption, and blood loss (Young et al., 2023).

The prevalence of iron deficiency also varies from country to country, and is more common in low-income countries. During pregnancy, iron requirements turn lower in the first trimester, then increase nearly threefold in the third trimester due to maternal red blood cell formation, placental needs, and fetal growth (Young et al., 2023).

3. Changes in Hemoglobin Levels Before and After (Difference) Sectio Caesarea

Based on the results of the distribution of changes in hemoglobin levels before and after sectio caesarea in pregnant women, it was found that out of 292 pregnant women, 160 pregnant women (54.8%) experienced an increase in hemoglobin levels. Meanwhile, 120 pregnant women (41.1%) experienced a decrease in hemoglobin levels and 12 other pregnant women (4.1%) did not experience any change in hemoglobin levels.

Theoretically, the increase in hemoglobin levels after childbirth is due to a decrease in the volume of plasma in the body due to increased urine excretion, so that the blood volume returns to its pre-pregnancy state. As a result, hemoglobin and hematocrit levels also increase. Two to five days after delivery, plasma volume may rise again, likely due to an increase in the hormone aldosterone, and then drop again. Studies have also shown a significant increase in hemoglobin between 6–8 weeks postpartum compared to 4–6 months postpartum, suggesting that the recovery of physiological hemoglobin decline during pregnancy takes about 4–6 months to return to normal pre-pregnancy values (Chandra et al., 2012).

Decreased hemoglobin can occur in pregnant women with anemia (especially iron deficiency anemia), bleeding, increased fluid intake, and pregnancy. Erythropoetin from the kidneys will stimulate the body to produce 20-30% more red blood cells during pregnancy. However, this increase is not proportional to the increase in blood plasma volume, resulting in hemodilution or blood dilution. As a result, hemoglobin concentrations decreased from about 15.0 g/dL to 12.5 g/dL, and in about 6% of women it could drop below 11.0 g/dL. (Tia, Kumaat and Lalenoh, 2016)

As gestational age progresses, hemoglobin levels that drop below 11.0 g/dL are considered abnormal and are usually caused by iron deficiency, not by increased blood volume during pregnancy. This is because iron intake from food and body reserves often does not meet the needs of pregnant women. To overcome this, the addition of iron and folic acid intake is very important to help increase hemoglobin levels again so that the mother and fetus remain healthy (Tia, Kumaat and Lalenoh, 2016).

In this study, intraoperative bleeding data were not analyzed further because they were not included in the study variables. However, as an overview of the patient's condition, out of a total of 292 samples, 215 samples were obtained with an average bleeding of 211.63 mL. In addition, 3 samples had only "minimal" records and as many as 74 samples had no bleeding records.

Research conducted by Yefet et al. (2020) showed that a decrease in hemoglobin (Hb) of ≥2 g/dL was related to the presence of postpartum hemorrhage. The greatest rate of decrease

in Hb as an indicator of blood loss occurs in the first 6–12 hours after delivery, then becomes stable (plateau) at 24–48 hours. Therefore, it is important for health workers not to miss the possibility of bleeding during childbirth and after childbirth, as well as to monitor postpartum Hb changes to predict excessive Hb decline (Yefet et al., 2020).

The results of this study explain that there is a significant change in Hb levels due to the possibility of blood loss during SC in this study sample is relatively minimal, there are no pathological conditions that affect Hb values.

4. Relationship of Age with Changes in Hemoglobin Levels (Hb Difference)

Based on the results of the Chi-Square test in the study, it was shown that there was no significant relationship between age and changes in Hb (p=0.555).

The results of this study are supported by research conducted by Aznam & Inayati (2021) showing that maternal age and parity are not related to the incidence of anemia because (p > 0.05), so the researcher assumes that it indirectly illustrates that variations in hemoglobin levels in pregnant women are not affected by differences in age or number of births (Aznam and Inayati, 2021).

Research conducted by Feleke and Feleke (2020) states that every 1 year of pregnancy reduces Hb levels by around 0.03g/dL (Feleke and Feleke, 2020). This means that as the mother ages, Hb concentrations tend to decrease even though they are still in the normal category.

These findings are different from the research conducted by Amini, Pamungkas, and Harahap (2018) which reported a strong relationship between age and the incidence of anemia, where anemia was more commonly found in mothers aged <20 years and >35 years. This difference can occur because the study assessed anemia as an outcome, while this study looked at changes in hemoglobin levels before and after having a cesarean section. (Amini, Pamungkas and Harahap, 2018)

5. Parity Relationship with Change in Hemoglobin Levels (Hb Difference)

Based on the results of the Chi-Square test, it was shown that there was no significant relationship between parity and changes in hemoglobin levels (p = p 0.221).

These findings are in line with research conducted by Aznam and Inayati (2021) which reported that parity was not significantly related to hemoglobin levels. Pregnant women with a parity of less than 2 are at risk of developing anemia (low Hb levels) because they still have limited experience and knowledge about pregnancy. This lack of experience and knowledge can have an impact on the inability to meet the nutritional needs needed during pregnancy, so that pregnant women with low parity are more at risk of anemia (Aznam and Inayati, 2021).

This study is different from the results of research conducted by Adawiyah and Wijayanti (2021) showing that there is a statistically significant relationship between the parity relationship and the incidence of anemia in pregnant women at the Samarinda Trauma Center Health Center. The occurrence of anemia in pregnancy is because in the condition of the mother who gives birth more than 2 times or too often greatly affects the condition of the mother's body both physically and mentally, when the mother gives birth to children more than 2 times, the mother's physical condition still needs more iron, both for the growth of the mother's own condition and the fetus she is carrying. If too often experiencing pregnancy and childbirth

causes iron that has not been optimally formed in the body, it will always decrease because the mother's body needs it as well as the fetus conceived (Adawiyah and Wijayanti, 2021).

CONCLUSION

Based on the results of this study, it can be concluded that the average hemoglobin (Hb) levels of pregnant women at YARSI Hospital remained within the normal range both before *sectio caesarea* (11.72 g/dL) and after the procedure (11.84 g/dL), with no statistically significant difference observed (paired t-test, p = 0.171). Furthermore, there was no significant association between changes in hemoglobin levels and maternal age (p = 0.555) or parity (p = 0.221). From an Islamic perspective, *sectio caesarea* is considered permissible as it aligns with *ḥifẓ al-nafs* (preservation of life) within the framework of *maqāṣid sharī'*ah, provided it is performed based on valid medical indications to prevent harm to the mother and fetus. Future research is recommended to use a longitudinal design with a larger sample size to better capture dynamic changes in hemoglobin levels, while also incorporating additional variables such as intraoperative blood loss, postoperative care, and long-term maternal recovery, as well as further exploring the integration of Islamic medical ethics in clinical decision-making.

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