

Original Research

The Impact of Age and Nutritional Status on Wound Healing After Caesarean Section

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ABSTRACT

Age and nutritional status are crucial in wound healing after a caesarean section. This study explores the relationship between these two factors and the duration of wound healing post-surgery at the Islamic University Hospital of Malang. Using a cross-sectional research design, the investigation will include all patients who had caesarean sections between March and May 2024, totalling around 31 respondents. The sampling technique employed for this study was total sampling. The Spearman Rank test was used to assess the data for statistical analysis. Findings show that 71% of respondents are in a non-risk age group, and 64.5% have good nutritional status. Conversely, 64.5% experienced poorly healing wounds. The Spearman Rank test produced a p-value of 0.005, indicating a significant relationship between age and wound healing duration, and a p-value of 0.000 showed a significant association between nutritional status and healing length. Correlation coefficients of 0.489 and 0.607 indicate moderate positive correlations. In conclusion, the study establishes relationships between age, nutritional status, and wound healing duration post-caesarean section, suggesting that future research should investigate other influencing factors like medical history and surgical complications.

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Introduction

Cesarean section delivery is defined as the process of delivering the fetus through an incision made in the abdominal wall (laparotomy) and the uterine wall (hysterotomy) (Ulfa, 2021). Childbirth is the process of delivering the fetus along with the placenta and pregnancy membranes from the uterus through the vagina. This process begins with contractions of the uterus that occur with regular frequency, duration, and strength (Rosmita Mico, 2021). There are two common methods of childbirth: normal delivery and cesarean section. Normal delivery is the process of delivering the fetus at full-term pregnancy (37-42 weeks) marked by uterine contractions leading to the thinning and dilation of the cervix, and then the fetus is pushed out through the vagina.

The prevalence of cesarean sections has been increasing year by year. According to the World Health Organization (WHO), the standard average rate for cesarean section (CS) is about 5-15% compared to normal deliveries. Data from the WHO Global Survey on Maternal and Perinatal Health 2011 showed that 46.1% of all births were through CS. The rate of childbirth by cesarean section has increased worldwide and has exceeded the 10%-15% range recommended by WHO in efforts to save the lives of mothers and babies. Latin America and the Caribbean contribute the highest rate of cesarean sections at 40.5%, followed by Europe (25%), Asia (19.2%), and Africa (7.3%).

In Indonesia, based on the 2018 Basic Health Research (RISKESDAS) results, the prevalence of cesarean sections in childbirth is 17.6%, with the highest rate in the Jakarta Special Capital Region (31.3%) and the lowest in Papua (6.7%) (Arda & Hartaty, 2021). Of all pregnant patients who may require specific interventions, only about 10% do, and among them, only a portion require cesarean surgery. However, data indicates that the rate of cesarean sections in private hospitals in cities across Indonesia exceeds 30%, with some even reaching 80% (Hayati, *et al.*, 2023)

A wound is the specific loss of tissue components affecting a particular part of the body, depending on the severity of the wound, which can result in relatively high morbidity and mortality rates (Wulandari, *et al.*, 2020).

The healing of wounds post-caesarean section is an important postoperative factor that is always encountered and is a complex phenomenon involving various processes, including inflammation, destructive, proliferative, and maturation phases. The inflammation phase is a crucial initial stage in the wound healing process, typically occurring within the first 4-7 days after injury or surgery. During this phase, there is an inflammatory response involving the release of inflammatory mediators, migration of inflammatory cells to the wound area, and clearance of debris and infectious agents.

The healing time for post-caesarean section wounds typically takes about one week if there are no infections, and it can extend for 1 year or more until the scar tissue becomes strong. Factors influencing wound healing include local factors such as wound management practices, hypovolemia, infection, and the presence of foreign bodies. There are various factors that can worsen wounds, such as contamination by microorganisms, tissue swelling around the wound (oedema), and bleeding (haemorrhage) at the wound site. Common factors include age, nutritional status, maternal conditions like anaemia and diabetes, medications, and the indication for cesarean section delivery (Sari & Fajri, 2020).

Surgical procedures during cesarean section delivery can lead to several complications, one of which is Surgical Site Infection (SSI). SSI is an infection that occurs within 30 days after the surgical procedure and is also a form of nosocomial infection. It is a significant patient safety indicator related to medical procedures, and surgical site infection is a major complication experienced by hospitalized patients (Kartikasari & Apriningrum, 2020).

One of the reasons for the high maternal mortality rate is due to surgical site infections following cesarean section operations. The incidence of maternal mortality rate can serve as a gauge reflecting the maternal health status, particularly the risks that concern mothers during pregnancy, childbirth, and the postpartum period. Indonesia, as a developing country, still faces a relatively high incidence of maternal mortality rate (Lestari, *et al.*, 2021).

The management of post-caesarean section wounds aims to enhance the wound healing process and prevent infections. Age is identified as a risk factor that can influence the postoperative wound healing process (Oktaviani, *et al.*, 2022). Age significantly affects wound healing and can impact all stages of the healing process.

Young age can accelerate wound healing because cells in the bodywork quickly to unite tissues, facilitating faster healing. As individuals age, various changes occur in the skin, such as reduced epidermal cell regeneration, weakened inflammatory response to wounds, decreased sensory sensation, reduced mechanical protection, and decreased skin barrier function. The speed of cell repair correlates with the growth or maturity of an individual's age, but ageing processes can subsequently impair cell repair systems, potentially slowing down wound healing (Oktaviani *et al.*, 2022).

Another factor that can affect the wound healing process is nutritional status. Improving nutritional status in post-caesarean section patients is necessary to accelerate wound healing. Poor nutritional status occurs when the body continuously lacks one or more essential nutrients over a prolonged period (Oktaviani *et al.*, 2022).

According to Rusjiyanto, in the context of postoperative wound healing, one of his studies on "The Effect of Zinc (Zn) and Vitamin C Supplements on the Speed of Post-Surgical Wound Healing" at the Regional General Hospital of Sukoharjo Regency, shows that more than half of the total surgical patients hospitalized for more than a week experience anaemia, malnutrition, or vitamin deficiency. Improving nutritional status in surgical patients is crucial to accelerating the healing process of surgical wounds and their underlying conditions. One contributing factor to these issues is that surgical patients in hospitals are often vulnerable to poor nutritional problems (Siswandi *et al.*, 2020).

According to a study conducted by (Romadhona, *et al.*, 2020) titled "The Relationship Between Age, Hemoglobin Levels, and Diabetes Mellitus with the Length of Wound Healing in Post-General Surgery Patients," out of 64 respondents, 43 respondents who were younger showed

better healing compared to 21 respondents who were older. Additionally, a previous study by (Oktaviani, *et al.*, 2022) titled "The Relationship Between Age, Nutrition, and Body Mass Index (BMI) on Post-Caesarean Section Wound Healing in Postpartum Mothers" stated that there is no significant relationship between age and BMI on wound healing.

Based on the issues mentioned, there are studies that show a relationship between age and the healing process of post-general surgery wounds, where younger patients tend to heal faster than older patients. However, another study indicates that there is no significant relationship between age and Body Mass Index (BMI) concerning wound healing. Due to these differing research findings, I am interested in conducting further research on the relationship between age and nutritional status with the duration of wound healing post-caesarean section during the inflammatory phase. This is because both age and nutritional status influence factors in the wound healing process. The objective of the study is to determine the relationship between age and nutritional status with the duration of wound healing in post-caesarean section patients.

Method

This study uses a quantitative descriptive-correlational research design with a cross-sectional method approach aimed at investigating the relationship between age and nutritional status with the duration of wound healing post-caesarean section surgery. The research was conducted from March 30 to May 26, 2024, at the Islamic Hospital of the Islamic University of Malang. The population for this study includes all patients who underwent caesarean section surgery, with an estimated 31 respondents in the last 3 months. The sampling method employed was total sampling, involving all 31 patients who underwent caesarean section surgery. Inclusion criteria were client post-caesarean section surgery on day 7 according to the patient's scheduled follow-up visit to the hospital, cooperative clients, and willingness to participate as respondents.

The research instruments used in this study are a demographic data questionnaire for

respondents and an observation sheet for wound assessment using the REEDA scale, involving direct observation of the respondents. Data collection commenced after obtaining ethical approval from the Ethics Committee of Health Research at the Islamic Hospital of Islamic University of Malang, certificate number 17/KEPK/RSI-U/III/2024, and was deemed ethically sound according to the 7 (seven) WHO 2011 standards on March 12, 2024.

The researcher observes the wound healing process by providing wound care to the respondents on the 7th day during their outpatient visit and records the results on the prepared observation sheet. Furthermore, to examine the relationship between age and nutritional status in wound healing, the Spearman correlation test (r) is used, supported by the SPSS computer program.

Results and Discussion

Table 1. Frequency Distribution of Characteristics of Patients Post-Caesarean Section Surgery (N=31)

	Variable	f	%
Education	Junior High	6	19.4
	School	16	51.6
	Senior High	9	29
	School Bachelor		
Occupation	Student	1	3.2
	Housewife	19	61.3
	Self-employed	9	29
	Lecturer	2	6.5
History of caesarean section	Once	12	38.7
	Never	19	61.3
Indication for caesarean section	Maternal Factors	25	80.6
	Fetal Factors	6	19.4

Based on Table 1, it is known that the characteristic of education level among patients post-caesarean section surgery at the Islamic Hospital of Islamic University of Malang shows that the majority have completed high school education, totalling 16 individuals (51.6%). Regarding occupation characteristics, the majority work as housewives, totalling 19 individuals (61.3%). In terms of the history of previous caesarean

section surgeries, the majority have never had one, totalling 19 individuals (61.3%). In terms of the indication for caesarean section, almost all cases were due to medical factors related to the mother, totalling 25 individuals (80.6%).

Table 2. Crosstabulation Between Age-Wound Healing, Nutritional Status-Wound Healing (N=31)

Categories		Wound healing (%)		
		Good	Fair	Poor
Age	At risk	0	6(19)	3(10)
	No risk	7(23)	14(45)	1(3)
	Total	7(23)	20(64)	4(13)
Nutritional Status	Good	7(23)	12(39)	1(3)
	Fair	0	5(16)	1(3)
	Poor	0	3(10)	2(7)

Table 2 shows that the crosstabulation result of wound healing with good criteria for the non-risk age group is 23%. However, wound healing has less favourable criteria in the non-risk age group at 45%. Meanwhile, wound healing with good criteria in the good nutritional status group is 23%. There is 39% of good nutritional status with less favourable wound healing.

Table 3. The Analysis Results of Age and Nutritional Status with The Duration of Wound Healing Post-Caesarean Section Surgery (N=31)

Spearman's rho	Age	Nutritional status	Wound healing
Age	1.000	-.111	.489**
Nutritional status	-.111	1.000	.607**
Wound healing	.489**	.607**	1.000
	.005	.000	.

Based on Table 3, it was found that the significance value (Sig. 2-tailed) for the age variable is 0.005. This indicates a significant relationship between age and the duration of wound healing post-caesarean section at the Islamic Hospital of the Islamic University of Malang. The correlation coefficient for age and the duration of wound healing post-caesarean section is 0.489, indicating a moderate positive correlation.

Meanwhile, for the nutritional status variable, the significance value (Sig. 2-tailed) is 0.000. This indicates a significant relationship between nutritional status and the duration of wound healing post-caesarean section at the Islamic Hospital of the Islamic University of Malang. The correlation coefficient for nutritional status and the duration of wound healing post-caesarean section is 0.607, indicating a strong positive correlation.

Identification of Age in Post-Caesarean Section Patients

The crosstabulation results show that there were 7 respondents, or 23%, with good wound healing in the non-risk age group. However, 14 respondents, or 45%, experienced less favourable wound healing in the non-risk age group. Age is one of the risk factors that can influence the wound healing process after surgery, including caesarean section wounds. As age increases, physiological changes occur in the body, which can affect the ability to heal wounds.

Research by Oktaviani *et al.* (2022) indicates that mothers of at-risk age may experience several physiological changes that can hinder the wound healing process, including a decrease in immune system function, reduced blood supply to the wound area, and changes in skin tissue that become thinner and less elastic.

Age is a non-modifiable factor; however, there are several efforts that can be made to support the wound healing process. One of these is to ensure adequate nutritional intake, particularly protein, vitamins, and minerals that play a role in wound healing. Additionally, optimal wound care, controlling risk factors such as diabetes or obesity, and close monitoring by healthcare professionals are also important.

Identification of Nutritional Status in Post-Caesarean Section Patients

The crosstabulation results show that there are 7 respondents, or 23%, with good nutritional status and good wound healing. However, there are 12 respondents, or 39%, with good nutritional status but poor wound healing.

Nutritional status is one of the important factors influencing the wound healing process. To expedite wound healing, it is necessary to improve the nutritional status of post-caesarean section patients. During the wound healing process, the body requires adequate nutritional intake to support various physiological mechanisms involved, such as the formation of new tissue, protein synthesis, and immune response (Siswandi *et al.*, 2020). Research by Siswandi *et al.* (2020) indicates that a patient's nutritional status can be measured using several parameters, such as Body Mass Index (BMI). BMI is used to assess underweight or overweight based on the comparison of weight and height. Research by Riandari *et al.* (2020) shows that nutritional status affects the wound healing process following cesarean section surgery.

Identifying nutritional status is important in determining the appropriate nutrition for patients after undergoing cesarean section surgery. Patients with inadequate nutritional status require a higher nutrient intake to support the wound healing process, while patients who are overweight need dietary modifications to prevent further complications. However, patient compliance and regularity in performing wound care according to the given schedule are necessary to support the wound healing process.

Identification of Wound Healing Duration in Post-Caesarean Section Patients

The crosstabulation results show that the wound healing process was good in 7 respondents, or 23%, in the non-risk age group. Wound healing was also good in 7 respondents, or 23%, in the good nutritional status group. However, it was also found that wound healing was less favourable in 12 respondents, or 39%, with good nutritional status. Additionally, wound healing was less favourable in 14 respondents, or 45%, in the non-risk age group.

A wound is the loss of tissue components in a specific manner that affects certain parts of the body, depending on the severity of the wound, which can result in relatively high morbidity and mortality (Wulandari *et al.*, 2020). A wound is considered healed when there is continuity of the skin layer and the strength of the

abdominal tissue is sufficient to perform normal activities without disruption. The wound healing process involves various complex mechanisms in the body, such as the inflammatory response, cell proliferation, formation of new tissue, and tissue remodelling (Putri, 2022). The healing of wounds in patients is measured using the REEDA scale, which assesses wound healing by observing five components: Redness (redness/infection at the wound site), Edema (swelling in the area around the wound), Ecchymosis (bruising around the wound), Discharge (the presence of fluid/serum from the wound), and Approximations (the closeness of the wound edges) (Aditiawarman, 2020).

A well-healed wound demonstrates progressive healing, such as a reduction in wound size, the formation of granulation tissue, and complete closure of the wound. The faster the wound closes and heals, the better the healing process is. Additionally, signs of infection, such as redness, swelling, pain, and fever, need to be carefully identified, as infection can slow down the wound healing process and increase the risk of complications. It is important to note the patient's compliance and regularity in wound care, supported by a balanced nutritional intake, which helps the wound healing process.

Relationship Between Age and Nutritional Status with the Duration of Wound Healing in Post-Caesarean Section Patients

The results of the Spearman's rho statistical test show that there is a correlation between age and wound healing with a p-value of 0.005. The correlation coefficient of 0.489 indicates a moderate positive correlation. Furthermore, the statistical test results show that there is a correlation between nutritional status and wound healing with a p-value of 0.000. The correlation coefficient of 0.607 indicates a strong positive correlation. This suggests that the higher the correlation coefficient, the stronger the correlation between the variables.

The results of this study align with the findings of research conducted by Romadhona *et al.* (2020), which showed a relationship between age and the duration of wound healing in post-general surgery patients, with

a p-value of 0.004. Research by Oktaviani *et al.* (2022) indicated that the wound healing process involves various complex mechanisms within the body, such as the inflammatory response, cell proliferation, formation of new tissue, and tissue remodelling.

Age and nutritional status are two important factors that have a close relationship with the wound healing process after cesarean section surgery. In mothers who are older and have poor nutritional status, these factors can exacerbate each other and increase the risk of complications such as wound infection or wound dehiscence (opening of the surgical wound). Therefore, it is important to monitor nutritional status according to the client's needs to prevent unexpected complications.

Conclusion

The age of post-caesarean section patients mostly falls into the non-risk category. From the research results, it is known that respondents in the non-risk age category tend to have shorter wound healing times.

The nutritional status of post-caesarean section patients mostly falls into the good category. From the research results, it is known that to accelerate the wound healing process, attention to dietary needs is crucial as it impacts nutritional status. The wound healing of post-caesarean section patients mostly falls into the poor category. This study focuses on measuring the duration of wound healing during the inflammatory phase. Based on the research, patients with excessive inflammatory responses tend to experience a longer inflammatory phase.

There is a significant relationship between age and wound healing post-caesarean section surgery and the strength of the relationship in this study is moderate with a correlation coefficient. A significant relationship between nutritional status and wound healing post-caesarean section surgery and the strength of the relationship in this study is strong with a correlation coefficient.

Limitations of the study

During the implementation of this research, the researcher acknowledges several limitations that need to be addressed

to support future advancements in knowledge. One of the limitations of this study is that some respondents received wound care outside of Islamic Hospital of Islamic University of Malang, which prevented direct observation of their wounds.

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Conflict of Interest

The author declares no conflict of interest in conducting this research. This study was conducted solely for scientific purposes, and there are no financial relationships that could influence the objectivity in conducting research, analyzing data, and presenting results.

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