



## Post-Cesarean Wound Healing Outcomes Among Women With Diabetes Mellitus: A Scoping Review

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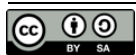
### ABSTRACT

**Background:** Diabetes mellitus contributes to impaired postoperative wound healing following cesarean section and increases the risk of surgical site infection, wound dehiscence, and delayed recovery. However, evidence regarding wound healing outcomes among diabetic women following cesarean section remains limited, particularly concerning implications for maternal nursing care. Therefore, this scoping review aimed to map the available evidence regarding postoperative wound healing outcomes following cesarean section among women with diabetes mellitus.

**Methods:** A scoping review was conducted using the JBI framework and PRISMA-ScR guidelines. Literature searches were performed in PubMed, SpringerLink, and ScienceDirect for studies published between January 2021 and January 2026. Five eligible studies were included in the final synthesis.

**Results:** The reviewed studies consistently demonstrated that diabetes mellitus was associated with surgical site infection, delayed wound healing, wound dehiscence, and impaired scar healing following cesarean section. The most frequently reported complications included surgical site infection, delayed wound healing, wound dehiscence, and impaired scar healing. Poor perioperative glycemic control emerged as an important contributing factor associated with adverse postoperative recovery outcomes.

**Conclusion:** Diabetes mellitus significantly affects postoperative wound healing following cesarean section and increases the risk of wound-related complications. Comprehensive maternal nursing care involving postoperative wound assessment, glycemic monitoring, infection prevention, and patient education may contribute to improved postoperative recovery and reduced wound-related complications among women with diabetes mellitus.



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## INTRODUCTION

Cesarean section is one of the most commonly performed surgical procedures worldwide, and its incidence continues to increase globally each year ([WHO, 2021](#)). Although cesarean delivery may reduce maternal and neonatal complications in high-risk pregnancies, postoperative wound healing complications remain an important clinical concern, particularly among women with diabetes mellitus. Persistent hyperglycemia may impair inflammatory regulation, angiogenesis, collagen synthesis, tissue perfusion, and immune response, thereby increasing the risk of surgical site infection (SSI), delayed wound healing, wound dehiscence, and impaired scar formation ([Dasari et al., 2021](#)). Consequently, women with gestational diabetes mellitus (GDM)

and pregestational diabetes mellitus are more vulnerable to adverse postoperative recovery outcomes following cesarean section.

Previous evidence consistently indicates that diabetes mellitus contributes to impaired postoperative wound healing outcomes following cesarean section, particularly through increased risk of surgical site infection, delayed wound healing, and impaired scar remodeling (Liu et al., 2025; Wang & Gao, 2025). Existing studies also suggest that hyperglycemia-related vascular and inflammatory dysfunction may prolong postoperative recovery and increase maternal morbidity. Although systematic reviews and meta-analyses have confirmed the association between diabetes mellitus and postoperative wound complications, current evidence remains largely focused on clinical outcomes rather than nursing-related postoperative management and maternal care implications (Hu & Wang, 2025; Wondmeneh & Mohammed, 2024). However, evidence specifically mapping wound healing outcomes and nursing implications among diabetic women following cesarean section remains limited. No previous scoping review has specifically mapped wound healing outcomes and nursing implications among diabetic women following cesarean section. Therefore, this scoping review aimed to map the available evidence regarding wound healing outcomes following cesarean section among women with diabetes mellitus and identify implications for postoperative maternal nursing care and future nursing intervention research. Understanding postoperative wound healing complications among diabetic women is important for maternal nurses because early wound assessment, glycemic monitoring, infection prevention, patient education, and discharge planning are essential components of evidence-based postoperative nursing care following cesarean section. This review aimed to answer the following research question: What evidence is available regarding wound healing outcomes following cesarean section among women with diabetes mellitus?

## **METHODS**

### **Research Design**

This study employed a scoping review design to systematically map and synthesize evidence regarding post-cesarean wound healing outcomes among women with diabetes mellitus. A scoping review approach was considered appropriate because the available literature remains heterogeneous regarding study design, outcome measurements, patient characteristics, and clinical focus. The review methodology followed the Joanna Briggs Institute (JBI) framework and was reported according to the PRISMA-ScR guidelines. This scoping review was not prospectively registered because the review aimed to provide exploratory mapping of the available evidence rather than evaluating intervention effectiveness. Nevertheless, the review process followed the Joanna Briggs Institute framework and PRISMA-ScR reporting guidelines to maintain methodological transparency.

### **Search Strategy**

A systematic literature search was conducted using PubMed, SpringerLink, and ScienceDirect databases. The search covered studies published between January 2021 and January 2026. The search strategy was developed using the PCC (Population, Concept, Context) framework, where the Population consisted of women with diabetes mellitus or gestational diabetes mellitus, the Concept focused on postoperative wound healing outcomes, and the Context involved cesarean section postoperative recovery. Keywords and Medical Subject Headings (MeSH) terms included (“cesarean section” OR “sectio caesarea”) AND (“diabetes mellitus” OR “gestational diabetes mellitus”) AND (“wound healing” OR “surgical site infection” OR “wound complication”). Boolean operators “AND” and “OR” were used to optimize the search process.

Reference management and duplicate removal were conducted using Mendeley. Article screening and eligibility assessment were conducted using Microsoft Excel and Mendeley reference management software. Screening and eligibility assessment were independently conducted by two reviewers. Any disagreements were resolved through discussion with the

supervising author until consensus was achieved. Ethical approval was not required because this study used published literature and did not involve direct human participation.

### **Eligibility Criteria**

Studies were included if they:

1. Investigated postoperative post-cesarean wound healing outcomes among women with diabetes mellitus or gestational diabetes mellitus.
2. Included postoperative outcomes such as surgical site infection, delayed wound healing, wound dehiscence, or scar healing.
3. Used observational, cohort, cross-sectional, retrospective, or prospective study designs.
4. Were published in English between 2021 and 2026.
5. Provided accessible full-text articles.

Studies were excluded if they were:

1. Review articles or meta-analyses
2. Editorials or conference abstracts
3. Animal studies
4. Unrelated to post-cesarean wound healing outcomes among diabetic women

### **Data Extraction and Quality Assessment**

The literature search from PubMed, SpringerLink, and ScienceDirect yielded 2,153 records. Initial title and abstract screening excluded most studies because they were not relevant to the review objectives, leaving 25 records for further evaluation. After duplicate removal, 13 full-text articles were assessed for eligibility. Following eligibility assessment based on the predefined inclusion criteria, five studies were included in the final synthesis. Screening and study selection were independently conducted by two reviewers and documented using the PRISMA-ScR flow diagram.

Data charting was conducted using a standardized extraction table including author, year, country, study design, sample characteristics, diabetes type, wound outcomes, and main findings. The extracted data were reviewed and synthesized descriptively to identify patterns and research gaps related to post-cesarean wound healing outcomes in women with diabetes mellitus.

### **Risk of Bias / Study Quality Assessment**

Although critical appraisal is not mandatory in scoping reviews, methodological assessment using the JBI critical appraisal tools was conducted to support transparency and interpretation of the synthesized evidence.

The methodological quality of the included studies was evaluated using the Joanna Briggs Institute (JBI) critical appraisal tools according to the specific design of each study. The quality assessment was conducted to enhance transparency in interpreting the evidence and to identify potential methodological limitations within the included literature. Different JBI appraisal checklists were applied for cohort, cross-sectional, and observational studies.

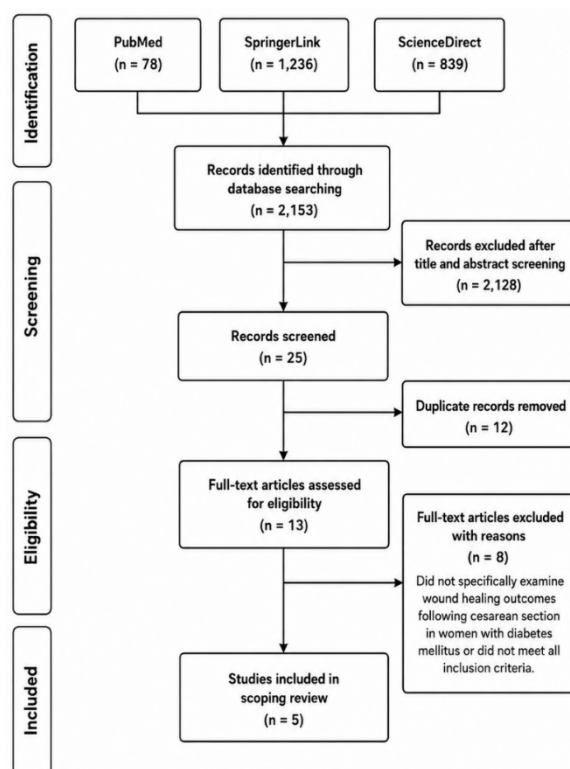
The included studies generally demonstrated acceptable methodological rigor. However, several limitations related to observational design, sample heterogeneity, and potential confounding factors were identified. Although most studies provided clear research objectives, appropriate methodologies, and relevant outcome measurements, several studies showed limitations related to sample heterogeneity, observational design, and limited control of confounding factors. These methodological considerations were taken into account during the interpretation and synthesis of the review findings. Most studies demonstrated moderate-to-good methodological quality, supporting the reliability of the synthesized findings. The reviewed evidence demonstrated that current evidence remains limited due to the predominance of observational and retrospective study designs.

**Table 1.** Study Quality Assessment of Included Studies

Study	Study Design	JBI Appraisal Tool	JBI Score	Quality Interpretation
Liu et al. (2025)	Observational study	JBI Checklist for Analytical Observational Studies	8/10	Good
Wang & Gao (2025)	Cross-sectional study	JBI Analytical Cross-Sectional Checklist	7/8	Good
Zhou et al. (2024)	Retrospective cohort study	JBI Cohort Checklist	9/11	Good
Albaharnah et al. (2024)	Retrospective cohort study	JBI Cohort Checklist	9/11	Good
Doğru et al. (2024)	Prospective observational study	JBI Cohort Checklist	10/11	Good

Note: Studies scoring  $\geq 70\%$  on the JBI checklist were categorized as good methodological quality. Higher JBI scores indicated lower risk of methodological bias and greater reliability of study findings. Nevertheless, observational and retrospective designs remain inherently limited in establishing causal relationships between diabetes mellitus and postoperative wound healing outcomes.

## RESULTS

**Figure 1.** PRISMA-ScR Flow Diagram

**Table 2.** Details of Article Review

Author and Year	Country	Study Design	Sample Characteristics	Type of Diabetes	Outcome Measurement	Glycemic Indicator	Wound Healing Outcomes	Main Findings	Study Limitations
Liu et al. (2025)	China	Observational study	Women with gestational diabetes mellitus undergoing cesarean section	Gestational Diabetes Mellitus (GDM)	Wound healing duration	Blood glucose level	Delayed wound healing time	Hyperglycemia was associated with prolonged wound healing and delayed postoperative recovery	Single-center study with limited sample diversity
Wang & Gao (2025)	China	Cross-sectional study	Post-cesarean women with diabetes mellitus	Diabetes Mellitus	Incidence of surgical site infection	Perioperative glucose level	Surgical site infection	Elevated perioperative blood glucose levels were significantly associated with increased risk of wound infection	Cross-sectional design limiting causal interpretation
Zhou et al. (2024)	China	Retrospective cohort study	Women with gestational diabetes mellitus following cesarean section	Gestational Diabetes Mellitus (GDM)	Postoperative wound assessment	HbA1c and glucose profile	Wound dehiscence	Diabetes mellitus increased the risk of postoperative wound complications, particularly wound dehiscence	Retrospective design and confounding bias
Albaharnah et al. (2024)	Saudi Arabia	Retrospective cohort study	1,584 post-cesarean women	Diabetes Mellitus	SSI incidence evaluation	Perioperative glucose level	Surgical site infection (SSI)	Diabetes mellitus was identified as an independent risk factor for SSI following cesarean section (OR = 10.76)	Limited generalizability to other populations
Doğru et al. (2024)	Turkey	Prospective observational study	170 post-cesarean women	Gestational and pregestational diabetes mellitus	Ultrasonographic scar evaluation	Glycemic status assessment	Residual myometrial thickness and scar healing	Diabetes mellitus was associated with reduced residual myometrial thickness, indicating impaired scar healing quality	Limited follow-up duration

The literature search across PubMed, SpringerLink, and ScienceDirect identified 2,153 records. After duplicate removal, 25 records remained for title and abstract screening. Following screening, 13 full-text articles were assessed for eligibility. Eight articles were excluded because they did not specifically address post-cesarean wound healing outcomes among women with diabetes mellitus or lacked relevant postoperative outcome data. Ultimately, five studies met all eligibility criteria and were included in the final synthesis. The limited number of eligible studies indicates the scarcity of nursing-focused evidence regarding post-cesarean wound healing among diabetic women following cesarean section.

The included studies consisted of observational and cohort designs conducted in China, Saudi Arabia, and Turkey. Collectively, the included studies involved more than 1,700 participants undergoing cesarean section across different clinical settings. Study populations included women with gestational diabetes mellitus (GDM) and pregestational diabetes mellitus undergoing cesarean section. The reviewed studies primarily examined postoperative wound healing outcomes, including surgical site infection (SSI), delayed wound healing, wound dehiscence, and scar healing quality. Across the included studies, surgical site infection and delayed wound healing were the most consistently reported postoperative complications. The evidence synthesis was organized into three major thematic categories: (1) delayed wound healing outcomes, (2) surgical site infection and wound complications, and (3) long-term scar healing impairment. This thematic categorization was developed to improve consistency in interpreting heterogeneous postoperative wound outcomes across the included studies.

The included studies demonstrated relatively consistent findings across different clinical settings, indicating that diabetes mellitus was associated with increased postoperative wound-related complications following cesarean section. The most frequently reported complications included surgical site infection, delayed wound healing, wound dehiscence, and impaired scar healing. Sample sizes varied substantially across studies, ranging from 170 participants to more than 1,500 post-cesarean women.

Considerable heterogeneity was identified across the included studies regarding study design, sample characteristics, diabetes classification, glycemic indicators, and postoperative wound outcome measurements. Variations in wound assessment methods and perioperative management protocols limited direct comparison across studies and contributed to differences in reported postoperative recovery outcomes. Postoperative wound outcomes were categorized into immediate wound complications, including surgical site infection, delayed wound healing, and wound dehiscence, as well as long-term scar healing outcomes.

### **Delayed Wound Healing**

Several included studies reported delayed postoperative wound healing among women with diabetes mellitus following cesarean section. Persistent hyperglycemia was associated with prolonged inflammatory response, impaired tissue regeneration, and slower wound closure. Liu et al. (2025) identified prolonged wound healing duration among women with gestational diabetes mellitus following cesarean section.

### **Surgical Site Infection**

Surgical site infection (SSI) emerged as one of the most frequently reported postoperative complications. [Wang and Gao \(2025\)](#) demonstrated that elevated perioperative blood glucose significantly increased SSI risk. Similarly, [Albaharnah et al. \(2024\)](#) identified diabetes mellitus as an independent risk factor for postoperative wound infection following cesarean section.

### **Scar Healing Impairment**

Evidence related to long-term scar healing outcomes was limited but indicated impaired scar healing quality among diabetic women following cesarean section. [Doğru et al. \(2024\)](#) reported reduced residual myometrial thickness, suggesting suboptimal scar remodeling and impaired postoperative tissue repair.

Overall, the included studies consistently demonstrated that diabetes mellitus was associated with unfavorable postoperative wound healing outcomes following cesarean section. Delayed wound healing, surgical site infection, wound dehiscence, and impaired scar healing emerged as the most commonly reported complications, with poor perioperative glycemic control identified as an important contributing factor across studies.

## **DISCUSSION**

This scoping review highlights that diabetes mellitus is a significant systemic factor influencing postoperative recovery following cesarean section. Women with diabetes mellitus demonstrated higher susceptibility to postoperative wound complications following cesarean section due to hyperglycemia-related vascular and inflammatory disturbances. These metabolic disturbances may interfere with normal tissue repair processes, thereby increasing susceptibility to infection, delayed wound closure, impaired scar formation, and other postoperative healing complications.

The findings also emphasize the clinical importance of comprehensive perioperative management in women with diabetes undergoing cesarean section. Effective glycemic control, early wound assessment, infection prevention strategies, and continuous postoperative monitoring appear to play essential roles in improving wound healing outcomes and reducing maternal postoperative morbidity. From a maternal nursing perspective, nurses play an important role in postoperative wound surveillance, glycemic monitoring, patient education, and infection prevention among diabetic women following cesarean section.

### **Impact of Diabetes on the Physiological Phases of Wound Healing**

The findings of this review indicate that diabetes mellitus negatively affects multiple phases of postoperative wound healing following cesarean section. Hyperglycemia interferes with normal tissue repair mechanisms, thereby contributing to delayed wound healing and postoperative wound complications. Across the included studies, poor perioperative glycemic control consistently emerged as an important factor associated with unfavorable postoperative recovery outcomes. Current findings indicate that comprehensive perioperative management plays an essential role in improving postoperative recovery among women with diabetes undergoing cesarean section.

From a physiological perspective, wound healing in diabetic patients is disrupted across all phases of tissue repair, including hemostasis, inflammation, proliferation, and remodeling. Persistent hyperglycemia may impair inflammatory regulation, tissue perfusion, collagen synthesis, and immune response, thereby contributing to delayed wound healing, surgical site infection, and impaired scar remodeling among diabetic women following cesarean section.

Beyond the direct physiological effects of hyperglycemia, the reviewed studies suggest that impaired wound healing in diabetic women is influenced by the interaction of metabolic, vascular, and inflammatory disturbances. These findings reinforce the importance of perioperative glycemic management and comprehensive postoperative wound monitoring to reduce wound-related complications following cesarean section in women with diabetes mellitus.

### **Glycemic Control as a Determinant of Wound Healing Outcomes**

One of the most consistent findings across the reviewed studies was the essential role of glycemic control in determining postoperative wound healing outcomes among women with diabetes mellitus. Patients with poorly controlled blood glucose levels demonstrated higher rates of postoperative complications, including delayed wound healing, wound dehiscence, and surgical site infection. Collectively, these studies highlight the clinical importance of perioperative glucose management in reducing postoperative morbidity and improving wound healing outcomes among women with diabetes mellitus.

Several physiological mechanisms may explain the relationship between hyperglycemia and impaired wound healing. Elevated blood glucose levels have been shown to impair leukocyte function, including reduced chemotaxis, phagocytic activity, and immune response effectiveness,

thereby increasing susceptibility to postoperative infection ([Liu et al., 2025](#)). Hyperglycemia also contributes to the accumulation of advanced glycation end products (AGEs), which promote oxidative stress, endothelial dysfunction, and vascular damage. In addition, impaired insulin signaling may disrupt protein synthesis, cellular proliferation, and tissue regeneration processes that are essential for effective wound repair ([Wang & Gao, 2025](#)).

The reviewed evidence further indicates that inadequate glycemic control may prolong recovery time and worsen postoperative outcomes in women undergoing cesarean section. Additional supporting literature outside the included studies also demonstrated similar findings. [Fadhil et al. \(2025\)](#) reported that diabetic patients experienced longer healing duration and higher rates of wound dehiscence compared to non-diabetic patients. Collectively, these findings emphasize the importance of perioperative blood glucose management, early metabolic monitoring, and targeted postoperative care strategies to improve wound healing outcomes in women with diabetes mellitus.

The reviewed evidence also suggests potential differences between gestational diabetes mellitus (GDM) and pregestational diabetes mellitus regarding postoperative wound recovery. Women with pregestational diabetes may experience more severe postoperative complications due to longer disease duration, chronic vascular impairment, and preexisting metabolic dysfunction. In contrast, although GDM is often temporary, inadequate glycemic control during pregnancy may still significantly impair postoperative wound healing and increase susceptibility to surgical site infection following cesarean section. However, direct comparative evidence between GDM and pregestational diabetes remains limited because most included studies did not perform subgroup analyses according to diabetes classification.

### **Increased Risk of Surgical Site Infection (SSI)**

Surgical site infection (SSI) emerged as one of the most frequently reported postoperative complications among women with diabetes mellitus following cesarean section. The included studies consistently indicated that diabetes mellitus serves as an independent risk factor for postoperative wound infection when compared with non-diabetic patients ([Albaharnah et al., 2024](#); [Wang & Gao, 2025](#)). The consistency of SSI findings across different study designs strengthens the evidence that diabetes mellitus is an important independent predictor of postoperative wound infection. The available evidence suggests that metabolic and vascular dysfunction contribute substantially to postoperative susceptibility to infection.

Several pathophysiological mechanisms may explain the elevated risk of SSI in diabetic patients. Chronic hyperglycemia impairs neutrophil chemotaxis, phagocytic activity, and bactericidal function, thereby weakening host immune defenses against microbial invasion. In addition, diabetes-related microvascular abnormalities reduce tissue perfusion and oxygenation, limiting the delivery of nutrients, immune cells, and antibiotics to the wound site. Impaired vascular maturation and endothelial dysfunction may further disrupt tissue regeneration and delay wound closure, creating conditions favorable for bacterial proliferation and persistent inflammation ([Dasari et al., 2021](#)).

The interaction between impaired immune response, vascular insufficiency, and delayed tissue repair may contribute to prolonged wound recovery and increased postoperative morbidity in women with diabetes mellitus. The evidence suggests the importance of infection prevention strategies, perioperative glycemic optimization, early wound assessment, and continuous postoperative monitoring in reducing SSI risk among post-cesarean patients with diabetes. Furthermore, the reviewed evidence highlights the need for more targeted nursing interventions focused on infection surveillance and postoperative wound management in this high-risk population.

### **Long-Term Outcomes and Scar Quality**

In addition to immediate postoperative complications, current findings suggest potential long-term effects of diabetes mellitus on cesarean scar healing quality. Only one included study specifically evaluated long-term scar healing outcomes, indicating limited available evidence regarding postoperative scar quality ([Doğru et al., 2024](#)). The findings support that diabetes may

negatively affect not only the early phases of wound healing but also the long-term structural integrity of postoperative scar tissue. However, evidence regarding long-term scar healing outcomes remains limited because only one included study specifically evaluated scar quality. These findings indicate that the impact of diabetes extends beyond immediate postoperative recovery and may also affect long-term uterine scar integrity and future maternal reproductive outcomes.

Impaired scar formation has significant clinical implications for future maternal reproductive health. Thinning of the uterine scar may increase the risk of complications in subsequent pregnancies, including cesarean scar defects, abnormal placentation, and uterine rupture ([Ducu et al., 2025](#)). Persistent metabolic and vascular disturbances associated with diabetes may contribute to inadequate collagen remodeling and reduced tissue tensile strength during the healing process. The evidence identified in this review suggests that postoperative wound assessment in women with diabetes should not be limited to short-term recovery indicators alone. Long-term monitoring of scar healing quality may also be important, particularly in women planning future pregnancies. These findings further highlight the need for comprehensive postoperative management strategies and follow-up care aimed at optimizing both immediate and long-term maternal outcomes after cesarean section in diabetic patients.

### **Summary of Main Findings**

This scoping review identified that diabetes mellitus was consistently associated with surgical site infection, delayed wound healing, wound dehiscence, and impaired scar healing following cesarean section. Poor perioperative glycemic control emerged as a major contributing factor associated with unfavorable postoperative recovery outcomes. The findings also indicate that comprehensive postoperative management and continuous maternal nursing care may help improve recovery outcomes among women with diabetes mellitus. In addition, the review identified substantial gaps in the current literature, as most available evidence remains observational with limited intervention-based and nursing-focused studies.

### **Comparison with Prior Literature**

The findings of this scoping review are generally consistent with previous systematic reviews and meta-analyses reporting an association between diabetes mellitus and adverse postoperative recovery outcomes following cesarean section. Previous evidence has demonstrated that women with gestational diabetes mellitus (GDM) are at greater risk of postoperative complications, including surgical site infection and delayed wound healing, particularly when glycemic control is inadequate ([Hu & Wang, 2025](#)). Similar patterns were identified across the studies included in the present review, where both gestational and pregestational diabetes were associated with impaired postoperative recovery. Previous reviews have also highlighted that surgical site infection remains one of the most common complications following cesarean section worldwide, with diabetes identified as an important contributing systemic factor ([Wondmeneh & Mohammed, 2024](#)). The current review supports these findings by demonstrating that hyperglycemia, vascular dysfunction, and inflammatory disturbances may collectively contribute to impaired tissue repair and increased postoperative morbidity among diabetic women.

Previous studies have also reported that diabetes mellitus contributes to impaired wound healing through vascular dysfunction, inflammatory dysregulation, and delayed tissue regeneration ([Suhandi et al., 2025](#)). These findings are consistent with the evidence identified in the present review. These mechanisms are consistent with the pathophysiological processes identified in the included studies of this review, suggesting that the negative impact of diabetes on tissue repair occurs across various types of surgical and chronic wounds, including post-cesarean wounds. Nevertheless, some variability remains within the existing literature. Several individual studies have reported that the association between diabetes and postoperative wound complications may be reduced when perioperative infection prevention, antibiotic prophylaxis, and glycemic management are adequately optimized ([Farisma et al., 2025](#)). These findings suggest

that postoperative outcomes may also be influenced by the quality of perioperative care and clinical management strategies rather than diabetes status alone.

Unlike previous reviews that primarily focused on overall postoperative complications or pooled quantitative outcomes, this scoping review aimed to map the range of wound healing outcomes, contributing factors, and potential implications for maternal postoperative care and nursing practice. The review also identified substantial heterogeneity in outcome measurements, study populations, and assessment methods across the existing literature. In addition, previous reviews have emphasized that wound healing following cesarean section is a complex and multifactorial process, particularly regarding uterine scar healing and long-term tissue remodeling. Variations in study design, patient characteristics, glycemic assessment methods, and wound outcome measurements may contribute to the heterogeneity observed across studies. The lack of standardized wound healing indicators and limited intervention-based evidence further complicate the interpretation and comparison of findings within the current literature.

This scoping review demonstrates a consistent association between diabetes mellitus and impaired post-cesarean wound healing outcomes. Across the included studies, diabetic women consistently demonstrated higher rates of postoperative complications, including surgical site infection, delayed wound healing, wound dehiscence, and impaired scar formation. These findings reinforce the importance of metabolic control and comprehensive postoperative management in improving maternal recovery outcomes. However, the review also identified substantial heterogeneity across the available evidence, particularly regarding study design, patient characteristics, glycemic assessment methods, and definitions of wound healing outcomes. In addition, most studies were observational in nature and primarily focused on clinical associations rather than evaluating targeted postoperative interventions or nursing care strategies. These limitations indicate important gaps within the current literature and highlight the need for more standardized and prospective studies to strengthen the evidence related to post-cesarean wound management in women with diabetes mellitus. Future research should prioritize large-scale prospective cohort studies to better clarify causal relationships between diabetes mellitus and post-cesarean wound healing outcomes. In addition, future intervention-focused research exploring perioperative glycemic management, standardized wound-care protocols, infection prevention strategies, and postoperative monitoring approaches are needed to strengthen evidence-based clinical practice. Further nursing-focused intervention studies are also recommended to evaluate the effectiveness of maternal nursing care, patient education, wound surveillance, and individualized postoperative care models in improving recovery outcomes among women with diabetes following cesarean section. The currently available evidence remains limited due to the predominance of observational study designs and the lack of intervention-based nursing research focusing on postoperative wound care among diabetic women following cesarean section.

### **Implications for Maternal Nursing Protocols**

The findings of this review suggest the need for standardized maternal nursing protocols for diabetic women undergoing cesarean section. Nursing interventions may include routine perioperative glucose monitoring, structured postoperative wound assessment, early infection surveillance, patient education regarding wound care, nutritional counseling, and scheduled postoperative follow-up. Risk-based postoperative monitoring protocols may help identify wound complications earlier and improve maternal recovery outcomes.

### **Implications for Nursing Practice**

Maternal nurses should perform routine postoperative wound assessment, perioperative glucose monitoring, infection surveillance, and patient education to reduce wound-related complications among diabetic women following cesarean section. Comprehensive and individualized nursing care may help reduce postoperative wound complications and improve recovery outcomes among women with diabetes mellitus. Previous evidence published in *Madago Nursing Journal* also highlighted the importance of nursing-based wound care interventions in improving skin and tissue integrity among patients with diabetes mellitus, emphasizing the role

of comprehensive wound management and continuous monitoring in postoperative recovery (Fantri et al., 2025). Early identification of wound-related complications and continuous postoperative monitoring are essential components of evidence-based maternal nursing care. Nursing interventions may also include individualized discharge planning, nutritional counseling, wound self-care education, scheduled postoperative follow-up, and early identification of infection-related warning signs. Structured postoperative nursing protocols may help improve maternal recovery outcomes and reduce preventable wound complications among diabetic women following cesarean section.

### **Study Limitations**

Several limitations should be considered when interpreting the findings of this scoping review. Most included studies employed observational and retrospective designs, limiting causal interpretation between diabetes mellitus and postoperative wound healing outcomes. In addition, substantial heterogeneity in study design, patient characteristics, wound outcome measurements, and perioperative management reduced comparability across studies. In addition, limited subgroup analyses across the included studies restricted direct comparison between gestational diabetes mellitus and pregestational diabetes mellitus regarding postoperative wound healing outcomes. Most included studies were conducted in middle-income countries, including China, Saudi Arabia, and Turkey, which may limit the generalizability of findings to other healthcare settings, including Indonesia. The review was also limited to English-language articles retrieved from three electronic databases, which may have introduced publication bias and restricted literature coverage. Database selection was based on accessibility and relevance to health science literature. Restriction to English-language publications may have introduced language bias and potentially limited the inclusion of relevant evidence published in other languages. Furthermore, only a limited number of studies met the inclusion criteria, and the available evidence primarily focused on clinical associations rather than intervention-based postoperative wound care or nursing management strategies. Therefore, the findings should be interpreted as an exploratory mapping of current evidence rather than definitive conclusions regarding intervention effectiveness.

### **CONCLUSION**

This scoping review demonstrates that diabetes mellitus is consistently associated with impaired post-cesarean wound healing outcomes, including surgical site infection, delayed wound healing, wound dehiscence, and impaired scar healing. The findings highlight the importance of perioperative glycemic control, postoperative wound monitoring, and comprehensive maternal nursing care to reduce postoperative complications among diabetic women. Future nursing intervention studies are recommended to evaluate the effectiveness of standardized wound-care protocols, patient education models, postoperative follow-up strategies, and nurse-led glycemic monitoring interventions in improving post-cesarean recovery outcomes among women with diabetes mellitus. The findings of this review may support the development of evidence-based maternal postoperative nursing protocols for diabetic women undergoing cesarean section.

**Author's Contribution Statement:** [Author 1 Diva Peni Agustin]: Validation, Investigation, Resources, Data Curation, Writing Original Draft, Visualization. [Author 2 Faizah Betty Rahayuningsih]: Conceptualization, Methodology, Formal analysis, Validation, Writing Review Editing, Supervision.

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