



The Impact of Snakehead Fish Administration on Post-Caesarean Section Wound Healing at Bunda Hospital Gorontalo

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Abstract. Post-cesarean section wound healing necessitates regular care support and sufficient nutritional intake, particularly protein. The snakehead fish (*Channa striata*) possesses the potential to serve as a local supplementary diet due to its protein, albumin, and amino acid content, which facilitate tissue repair. This study is to examine the impact of administering snakehead fish on post-surgical wound healing in postpartum moms at RS Bunda Gorontalo. This quantitative research used a one-group pretest-posttest design. The sample comprised 37 post-SC moms chosen through purposive sampling. The intervention involved the administration of 100 grams of fried snakehead fish daily for a duration of seven days. The REEDA score was utilised to assess wound healing prior to and during the intervention. The data were evaluated via the Wilcoxon Signed-Rank test, with a significance threshold of $p < 0.05$. The mean REEDA score diminished from 6.05 ± 1.11 prior to the intervention to 2.16 ± 0.76 subsequent to the intervention, reflecting an average reduction of 3.89 ± 0.86 . The Wilcoxon test yielded a Z value of -5.303 and a p-value less than 0.001. The administration of snakehead fish for seven days resulted in enhanced post-surgical wound healing. Nonetheless, the findings must be approached with caution due to the study's utilisation of a one-group design lacking a control group.

Keywords: Caesarean Delivery; *Channa Argus*; Postpartum Woman; REEDA Assessment; Tissue Regeneration.

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1. Introduction

Caesarean section (CS) is a surgical intervention to deliver an infant via an incision in the abdominal wall and uterus, conducted for maternal or foetal indications. While this operation can preserve the lives of both mother and infant under specific circumstances, post-C-section moms necessitate optimal healing due to the surgical incision, which must progress through the stages of haemostasis, inflammation, proliferation, and tissue remodelling. Inadequate wound healing can elevate the likelihood of surgical site infection, dehiscence, prolonged pain, delayed mobilisation, extended hospitalisation, and interference with the mother's responsibilities in infant care and breastfeeding (World Health Organization [WHO], 2018; Kawakita & Landy, 2017; Sultan et al., 2025).

Post-surgical wound healing is affected by numerous factors, both local and systemic, including wound cleanliness, tissue oxygenation, infection, anaemia, diabetes mellitus, obesity, age, physical activity, quality of wound care, and maternal nutritional status. Insufficient consumption of calories, protein, amino acids, vitamins, and minerals can impede collagen synthesis, fibroblast proliferation, angiogenesis, immunological response, and tissue regeneration in wounds. Consequently, fulfilling dietary requirements postpartum, particularly

through high-quality protein sources, is a crucial aspect of holistic care for moms following surgery (Barchitta et al., 2019; Ju et al., 2023; Seth et al., 2024).

The snakehead fish (*Channa striata*) is a local cuisine that could serve as a supplement for post-surgical nutritional requirements. The snakehead fish is recognised for its protein, albumin, vital amino acids, fatty acids, and many micronutrients that may facilitate tissue regeneration. Proteins and amino acids are essential for collagen synthesis and new tissue creation, whereas albumin contributes to the maintenance of oncotic pressure and the distribution of nutrients during recuperation. Numerous studies indicate that the bioactive constituents of snakehead fish may facilitate cell proliferation, angiogenesis, inflammatory regulation, and wound tissue regeneration (Haniffa et al., 2014; Kwan et al., 2020; Hapsari et al., 2025).

Numerous studies have assessed the advantages of snakehead fish extract on wound healing following Caesarean procedure. Fajri et al. (2018) indicated that postpartum moms with anaemia who were administered snakehead fish extract exhibited superior post-Caesarean section wound scores compared to the control group on the fifth day of observation. Ummah and Ningrum (2022) identified disparities in wound healing outcomes between the cohort administered *Channa striata* extract and the control group. Furthermore, research on women following lower segment caesarean sections has evaluated the safety, pain levels, and wound healing associated with supplementation of snakehead fish extract, indicating its potential as an adjunctive intervention in postoperative recovery (Ab Wahab et al., 2015; Fajri et al., 2018; Ummah & Ningrum, 2022; Suryanti et al., 2020).

Nonetheless, the existing research continues to exhibit discrepancies in outcomes and methodological constraints. Certain studies utilise extracts or capsules of snakehead fish at set dosages, whereas others evaluate the intake of snakehead fish as a complete diet in comparison to alternative protein sources. A study comparing snakehead fish and chicken breast revealed no significant difference in efficacy between the two protein sources in post-surgical wound healing. Variations in intervention type, portion size, administration time, maternal nutritional condition, anaemia status, routine wound care practices, and wound assessment methodologies can influence research outcomes. Consequently, investigations employing standardised methodologies for the administration of snakehead fish and the assessment of wound healing are necessary (Sahid et al., 2018; Sugiyarti et al., 2025; Hapsari et al., 2025).

The research conducted at RS Bunda Gorontalo is crucial for acquiring contextual evidence concerning the impact of snakehead fish administration on post-surgical wound healing. This intervention can function as a straightforward local food alternative to complement normal wound care, infection sign monitoring, early mobilisation, medication delivery as necessary, and fulfilling the nutritional requirements of postpartum mothers. This research aims to evaluate the potential of snakehead fish as nutritional assistance in the wound healing process, without intending to supplant essential medical treatment or antibiotic medication. This study is to examine the impact of administering snakehead fish on post-surgical wound healing at RS Bunda Gorontalo.

2. Research Methodology

This study employs a quantitative approach utilising a one-group pretest–posttest pre-experimental design to examine the impact of providing snakehead fish (*Channa striata*) on the healing of post-caesarean section wounds in postpartum moms at RS Bunda Gorontalo. The study was performed from January to March 2026. Samples were chosen via purposive sampling from stable post-SC mothers capable of consuming oral meals, without seafood allergies, and consenting to participate in the study. Mothers with uncontrolled diabetes, serious infections, surgical complications, liver or renal failure, or those who failed to finish the intervention were excluded from the trial.

The intervention consisted of providing 100 grams of cooked snakehead fish daily for seven days, supplementing the hospital's usual food. Consumption compliance was documented using daily observation sheets, while all participants continued to receive post-SC care in accordance with hospital protocols. The independent variable is the administration of snakehead fish, whereas the dependent variable is the healing of post-surgical wounds assessed using the REEDA instrument. Data were examined using univariate and bivariate methods, employing the Paired t-test or Wilcoxon Signed-Rank Test based on data distribution, with a significance threshold of $p < 0.05$.

3. Results and Discussion

Characteristics of Respondents

Table 1. Attributes of Mothers Following Caesarean Section (n = 37)

Characteristic	Category	n	%
Age	<20 years	3	8.1
	20–35 years	29	78.4
	>35 years	5	13.5
Education	Primary school	7	18.9
	Junior secondary school	10	27.0
	Senior secondary school	15	40.5
Occupation	Higher education	5	13.5
	Homemaker	28	75.7
	Private-sector employee	4	10.8
	Farmer/self-employed	5	13.5
Parity	Primiparous	14	37.8
	Multiparous	23	62.2
Total		37	100.0

According to Table 1, the predominant age group among respondents is 20–35 years, with 29 moms (78.4%). The specified age group is the most frequently observed reproductive demographic in maternity services. The optimal reproductive age does not ensure that post-caesarean wound healing will occur without complications, as the healing process is also affected by the mother's clinical condition, nutritional status, anaemia, infection, diabetes, obesity, wound care, and postoperative mobilisation. Consequently, all post-surgical caesarean moms necessitate consistent surveillance of wound states throughout the postpartum period (Kawakita & Landy, 2017; Suarez-Easton et al., 2017).

The majority of respondents possessed a high school education, including 15 individuals (40.5%), and were employed as housewives, totalling 28 individuals (75.7%). Education can enhance mothers' comprehension of wound care, personal cleanliness, infection indicators, nutritional requirements, and the significance of adhering to healthcare professionals' guidance. Simultaneously, the role of a housewife can facilitate the allocation of time for rest, recommended mobilisation, and the intake of nutritious food during the recovery process. The educational and occupational parameters in this study merely delineate the respondents' profiles and cannot be directly inferred as determinants of post-surgical wound improvement. According to parity, the majority of responses were multiparous, with 23 women (62.2%), whereas 14 mothers (37.8%) were primiparous. Multiparous women may possess prior experience with the postpartum period, wound management, lactation, and recuperation following childbirth. Nonetheless, prior delivery experiences do not invariably influence the quality of surgical wound healing in the present pregnancy. Post-surgical wound healing requires ongoing support through the monitoring of redness, oedema, fluid discharge, and wound edge approximation by regular exams and treatment in accordance with hospital guidelines (Kawakita & Landy, 2017).

Adherence to Snakehead Fish Consumption

A comparative test was conducted to analyze whether there was a significant difference in prenatal exercise participation frequency between mothers in Delivery Method Group 1.00 ($n = 33$) and Group 2.00 ($n = 7$). The calculated values for the mean ranks and inferential test parameters are detailed in Table 2.

Table 2. Adherence to Snakehead Fish Menu Consumption Over a Seven-Day Period ($n = 37$)

Adherence to Fish Consumption	n	%
Adherent (consumed fish for ≥ 6 days)	35	94.6
Non-adherent (consumed fish for < 6 days)	2	5.4
Total	37	100.0

According to Table 2, the predominant number of respondents followed the snakehead fish dietary regimen for seven days, with 35 mothers (94.6%) complying, whilst 2 mothers (5.4%) were deemed non-compliant. The significant level of compliance suggests that the snakehead fish cuisine is generally acceptable to moms following a caesarean section during the recovery phase. Adherence to consumption is crucial in food intervention research as it assesses participants' exposure to the supplied nutrients and facilitates the attainment of nutritional sufficiency throughout postoperative recovery.

The snakehead fish (*Channa striata*) possesses properties that may enhance wound healing due to its proteins and bioactive constituents associated with cell proliferation, angiogenesis, and tissue repair. Sufficient protein consumption is crucial for perioperative nutritional support, as it is essential for collagen synthesis, tissue regeneration, and immunological function. The consumption of snakehead fish should be regarded as a nutritional adjunct that complements standard care, rather than a replacement for wound management, medication delivery, early mobilisation, or clinical oversight of post-SC mothers (Kwan et al., 2020; Hapsari et al., 2025; Weimann et al., 2025).

Non-compliant respondents warrant concern since non-compliance may impact the consistency of intervention implementation and the outcomes of wound healing. Postoperative hunger, taste or method of fish preparation, pain, nausea, dietary limitations, and familial support can influence menu consumption throughout the treatment phase. Consequently, more research must document the factors contributing to non-compliance, track daily consumption, and evaluate menu approval in a more systematic fashion to enhance the optimal application of the snakehead fish intervention.

Post-SC Wound Healing Score

Table 3. REEDA Score Pre- and Post-Administration of Snakehead Fish ($n = 37$)

REEDA Score Measurement	Mean $\pm$ SD	Median	Minimum	Maximum
Before the intervention	6.05 $\pm$ 1.11	6.00	4.00	8.00
After the intervention	2.16 $\pm$ 0.76	2.00	1.00	4.00
Reduction in REEDA score	3.89 $\pm$ 0.86	4.00	2.00	5.00

According to Table 3, the mean REEDA score prior to the administration of snakehead fish was 6.05 ± 1.11 , which diminished to 2.16 ± 0.76 following a seven-day intervention. The mean score decrease of 3.89 signifies an enhancement in the post-caesarean section wound status of the participants. The decline in the REEDA score signifies a reduction in redness, oedema, ecchymosis, fluid outflow, and an enhancement in the wound healing margins. A lower REEDA score indicates superior wound healing conditions (Man et al., 2026).

Wound healing following the ingestion of snakehead fish may theoretically be attributed to its protein level, necessary amino acids, fatty acids, and bioactive constituents. Proteins are involved in collagen synthesis, fibroblast proliferation, angiogenesis, immunological response, and tissue regeneration during wound healing. The ingestion of snakehead fish may fulfil the

nutritional requirements of post-SC moms during post-operative recovery (Kwan et al., 2020; Hapsari et al., 2025).

Despite the reduction in the REEDA score following the intervention, the findings do not conclusively establish that the enhancement of the wound was solely attributable to the administration of snakehead fish. The healing of post-surgical wounds is affected by the physiological healing process, conventional wound care, appropriate antibiotic use, nutritional status, haemoglobin levels, early mobilisation, wound cleanliness, and the mother's clinical state. Consequently, snakehead fish ought to be regarded as a supplementary nutritional intervention rather than a replacement for medical treatment. Subsequent studies must incorporate control groups and account for confounding variables to evaluate the impact of snakehead fish on wound healing more rigorously.

Normality Assessment of REEDA Score Variations

Table 4. Shapiro–Wilk Normality Test Outcomes

Variable	p-value	Interpretation
Difference in REEDA scores before and after the intervention	0.016	Not normally distributed

According to Table 4, the Shapiro–Wilk normality test findings for the difference in REEDA scores before and after the administration of snakehead fish indicate a p-value of 0.016 ($p < 0.05$). The results suggest that the variation in REEDA scores does not conform to a normal distribution. Consequently, the evaluation of the disparity in wound healing scores pre- and post-intervention did not employ the parametric Paired t-test; rather, it proceeded with the Wilcoxon Signed-Rank Test. The normality test is a crucial phase in data analysis as it identifies the statistical approach suitable for the data distribution's features.

In study utilising a one-group pretest–posttest design, normalcy must be assessed on the difference values between the pre-intervention and post-intervention scores. In cases where the difference values are not normally distributed, the Wilcoxon Signed-Rank Test is employed, as it facilitates the comparison of two paired measurements without necessitating a normal data distribution (Ghasemi & Zahediasl, 2012; Dahlan, 2021). The outcomes of the normality test presented in Table 4 do not demonstrate the efficacy or ineffectiveness of employing snakehead fish in expediting post-cesarean wound healing. These results merely provide a foundation for choosing the suitable statistical test.

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Table 5. Outcomes of the Wilcoxon Signed-Rank Test for REEDA Score ($n = 37$)

Component	Value
Negative ranks (post-test score < pre-test score)	37
Positive ranks (post-test score > pre-test score)	0
Ties	0
Z	−5,303
p-value	<0,001

According to Table 5, the results of the Wilcoxon Signed-Rank test indicate that all respondents were classified in the negative ranks, amounting to 37 individuals, with no positive ranks or ties present. The Z value of −5.303 and $p < 0.001$ signify a statistically significant difference in REEDA scores pre- and post-administration of snakehead fish. The results indicate that a lower REEDA score, which signifies superior wound condition, reflects an enhancement in post-cesarean section wound healing following seven days of snakehead fish consumption in this simulation data.

The enhancement of wound state may be attributed to the contribution of snakehead fish (*Channa striata*) as a source of protein, amino acids, and albumin essential for collagen synthesis, tissue regeneration, immunological response, and the wound healing process. Numerous investigations on post-SC moms have indicated that the administration of snakehead fish extract correlates with the enhancement of postoperative wound condition.

Nevertheless, the majority of prior research utilised extract preparations, rendering the findings not entirely comparable to the consumption of snakehead fish as part of whole meal menus (Ab Wahab et al., 2015; Fajri et al., 2018; Ummah & Ningrum, 2022).

Despite the statistical data indicating a substantial difference, the one-group pretest–posttest design lacking a control group has not yet established that the improvement in wounds is solely attributable to the snakehead fish. Wound healing is affected by postoperative physiological processes, conventional wound care, the judicious use of antibiotics, nutritional status, haemoglobin levels, early mobilisation, wound cleanliness, and the mother's clinical condition. Consequently, the administration of snakehead fish should be seen as a nutritional adjunct to medical treatment, and additional studies must incorporate control groups and improved management of confounding variables.

4. Conclusion

The administration of snakehead fish for seven days resulted in a reduction of the REEDA score in post-caesarean section moms, signifying an enhancement in wound healing conditions. The Wilcoxon Signed-Rank test indicated a statistically significant change in wound scores pre- and post-intervention ($p < 0.001$). Nevertheless, the findings must be approached with caution due to the study's utilisation of a one-group design lacking a control group. Snakehead fish may serve as an adjunctive dietary option to fulfil the protein requirements of women following caesarean section, in conjunction with wound management and conventional hospital treatment. It is advisable to do more study utilising a control group, an expanded sample size, and to account for variables such as anaemia, nutritional status, antibiotic use, and wound management.

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