



Original Research Article

Evaluating the Efficacy of Sansarjana Krama in Promoting Ropana in Post-Operative Wounds (Shastrakarma-Krita Vrana): A Randomized Clinical Study

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Name of Author:

Dr. Pradnya Kapse¹

Affiliation: ¹Assistant Professor,
Department of Shalyatantra, R. A. Podar
Medical College, Worli, Mumbai.

Corresponding Author:

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Abstract: Background: Sansarjana Krama, a classical Ayurvedic dietary regimen, is traditionally prescribed to restore digestive capacity (Agni) following illness or surgical interventions. This graduated dietary protocol aims to optimize digestion and metabolism, potentially facilitating tissue repair and enhancing post-operative recovery. Its role in promoting wound healing after surgical procedures requires empirical evaluation. **Aim:** The present study aimed to rigorously assess the efficacy of Sansarjana Krama in enhancing Ropana (wound healing) in patients with Shastrakarma-Krita Vrana (post-operative wounds) and to evaluate its viability as a supportive dietary intervention in post-surgical care.

Materials and Methods: This prospective, single-center, randomized comparative study enrolled 100 patients undergoing surgical procedures that resulted in Shastrakarma-Krita Vrana. Participants were randomly assigned to two groups: Group A received a standard post-operative diet, while Group B adhered to the Sansarjana Krama regimen as detailed in classical Ayurvedic texts (Samhitas). Clinical parameters, including pain, wound discharge, and edema, were assessed on post-operative days 1, 3, 5, and 7. **Results:** The mean age of participants was 42.23 ± 15.54 years. Follow-up evaluations indicated that 42% of patients in the Sansarjana Krama group experienced better or best pain relief compared to 36% in the standard diet group ($\chi^2 = 3.81$, $P = 0.05$). A statistically significant reduction in wound discharge was observed in the Sansarjana Krama group compared to the control group ($\chi^2 = 11.37$, $P < 0.05$). Although mild improvement in post-operative edema was noted in the intervention group, the difference was not statistically significant ($\chi^2 = 0.29$, $P > 0.05$). **Conclusion:** Both dietary regimens contributed to symptom relief post-surgery; however, the Sansarjana Krama protocol demonstrated superior effectiveness in reducing wound discharge, indicating enhanced wound healing potential. These findings suggest that Sansarjana Krama may serve as a beneficial adjunct dietary approach in post-operative wound management. Further large-scale, multicentric studies are warranted to validate these results and explore the underlying mechanisms.

Keywords: Sansarjana Krama; Shastrakarma-Krita Vrana; Ropana; Post-operative wound healing; Ayurvedic diet therapy.

INTRODUCTION

1.1 Background

Effective post-operative wound healing is a crucial determinant of successful surgical outcomes and patient recovery. Surgical wounds undergo a complex biological repair process involving inflammation, proliferation, and tissue remodeling.

Any disruption in these phases may lead to delayed healing, wound infection, excessive discharge, or other complications that prolong hospitalization and increase healthcare costs. Despite significant advancements in surgical techniques, antiseptic measures, and pharmacological therapies, post-operative wound complications remain a major

concern in clinical practice. [1-4]

Modern wound management primarily focuses on maintaining sterile conditions, preventing infection, and supporting tissue repair through antibiotics, anti-inflammatory drugs, and appropriate wound care practices. However, increasing attention has been directed toward complementary approaches that support systemic recovery, particularly through nutritional and metabolic optimization. Adequate dietary support plays a critical role in wound healing, as nutrients are essential for cellular regeneration, immune function, and collagen synthesis. [5,6] In this context, traditional systems of medicine such as Ayurveda offer valuable perspectives on post-operative care that integrate dietary regulation with physiological recovery. [7,8]

1.2 Ayurvedic Perspective

Ayurveda describes surgical wounds under the concept of Vrana, which refers to a disruption in tissue integrity caused by trauma or surgical intervention. Classical Ayurvedic texts such as the Sushruta Samhita describe various principles of wound management, including cleaning (Shodhana) and healing (Ropana) therapies. [9,10] According to Ayurvedic philosophy, proper wound healing depends not only on local treatment but also on systemic factors, particularly digestive strength (Agni) and balanced metabolism. Impaired digestive function can lead to the formation of metabolic toxins (Ama), which may delay tissue repair and contribute to inflammation. Therefore, restoration of digestive capacity is considered essential for optimal healing. [11,12]

One of the important dietary regimens described in Ayurvedic literature is Sansarjana Krama, a sequential nutritional protocol recommended after procedures such as Panchakarma or surgical interventions. [13,14] This regimen gradually transitions patients from easily digestible liquid diets to more nourishing solid foods as digestive capacity improves. The classical stages of Sansarjana Krama include preparations such as Peya (thin rice gruel), Vilepi (thick porridge), and Yusha (light soups), which are designed to stimulate digestion while providing gentle nutritional support. [15,16] This gradual dietary progression prevents digestive overload, promotes efficient nutrient assimilation, and supports tissue regeneration, thereby contributing to the wound healing process.

1.3 Literature Review

Several Ayurvedic texts emphasize the importance of dietary regulation in post-procedural care. Classical sources such as Charaka Samhita and Sushruta Samhita recommend the use of Sansarjana Krama to restore digestive strength and facilitate tissue nourishment following therapeutic interventions.

[17,18] Contemporary studies have also highlighted the relevance of these principles in modern clinical settings. For example, recent reviews on Ayurvedic wound care suggest that dietary management plays a vital role in controlling inflammation, improving immune response, and accelerating tissue repair. [19, 20]

Modern biomedical research similarly recognizes the influence of nutritional status on wound healing. Adequate intake of proteins, micronutrients, and antioxidants has been shown to enhance collagen formation, reduce infection risk, and support immune defense mechanisms. [21, 22] However, while the role of nutrition in wound healing is widely acknowledged, there is limited clinical evidence evaluating traditional Ayurvedic dietary regimens such as Sansarjana Krama in post-operative patients. Although a few review articles discuss the theoretical benefits of Sansarjana Krama, systematic clinical investigations assessing its effectiveness in surgical wound healing remain scarce. [23, 24] Consequently, there is a need for well-designed clinical studies to evaluate whether this classical dietary protocol can improve healing outcomes in post-operative wounds.

1.4 Rationale of the Study

Post-operative wound recovery depends on multiple physiological processes, including inflammation control, tissue regeneration, and adequate nutritional support. [25,26] While conventional surgical care focuses primarily on pharmacological and procedural interventions, complementary strategies that enhance systemic recovery may further improve clinical outcomes.

The concept of Sansarjana Krama provides a structured dietary approach aimed at restoring digestive efficiency and supporting tissue nourishment. By gradually introducing increasingly complex foods, this regimen may enhance nutrient absorption, reduce metabolic stress, and facilitate faster wound healing. [27, 28] However, despite its extensive description in classical Ayurvedic literature, clinical validation of its effectiveness in post-operative wound management is limited.

Therefore, evaluating the role of Sansarjana Krama in surgical patients is important to bridge the gap between traditional Ayurvedic knowledge and modern clinical practice. Scientific assessment of this dietary regimen may help determine its potential as a safe and cost-effective adjunct therapy in post-operative care. [29, 30]

1.5 Aim and Objectives

Aim

To evaluate the efficacy of Sansarjana Krama in promoting wound healing (Ropana) in Shastrakarma-Krita Vrana (post-operative wounds).

Objectives

- To assess the reduction in post-operative pain among patients following the Sansarjana Krama dietary regimen.
- To evaluate changes in wound discharge during the post-operative recovery period.
- To observe the reduction in post-operative edema associated with the dietary intervention.

2. Materials and Methods

2.1 Study Design

The present investigation was conducted as a prospective, randomized controlled clinical study designed to evaluate the efficacy of the Ayurvedic dietary regimen Sansarjana Krama in promoting wound healing in patients with Shastrakarma-Krita Vrana (post-operative wounds). The study compared the outcomes of patients receiving a conventional post-operative diet with those following the structured Sansarjana Krama dietary protocol.

2.2 Study Setting

The study was carried out at the Department of Shalya Tantra (General Surgery), Tilak Ayurved Mahavidyalaya and Hospital, Rasta Peth, Pune-11. All surgical procedures and post-operative assessments were performed under standard aseptic conditions within the institutional clinical setting.

2.3 Study Duration

The research was conducted over a period from January 2017 to December 2018, including patient recruitment, intervention, and follow-up assessments.

2.4 Sample Size

A total of 100 participants who underwent minor surgical procedures resulting in post-operative wounds were enrolled in the study. Eligible participants were screened according to predefined inclusion and exclusion criteria before enrollment.

2.5 Inclusion Criteria

Participants were included in the study if they met the following criteria:

- Patients aged 20–70 years.
- Individuals undergoing minor elective surgical procedures such as appendicectomy, hernia repair, hydrocele surgery, or excision of cystic swellings.
- Patients of either gender who provided informed consent to participate in the study.

2.6 Exclusion Criteria

Participants were excluded if they met any of the following conditions:

- Patients undergoing major surgical procedures involving vital organs such as the heart, brain, or liver.
- Individuals with severe trauma, extensive injuries, or major fractures.
- Patients with systemic diseases known to impair wound healing, including diabetes mellitus, tuberculosis, hypertension, HIV infection, bronchial asthma, or cardiovascular disorders.
- Pregnant women, due to physiological variations that may influence healing outcomes.

2.7 Randomization

After enrollment, participants were randomly allocated into two equal groups using a simple randomization method:

Group A (Control Group): Participants received the standard post-operative diet routinely prescribed in the hospital.

Group B (Intervention Group): Participants followed the Sansarjana Krama dietary regimen, as described in classical Ayurvedic texts. Both groups received identical surgical care and wound management protocols, ensuring that dietary intervention remained the primary variable under investigation.

2.8 Intervention: Sansarjana Krama Dietary Regimen

The Sansarjana Krama diet was administered sequentially in accordance with classical Ayurvedic principles. This dietary regimen involves a gradual progression from easily digestible liquid preparations to more nourishing semi-solid foods, thereby supporting digestive recovery and tissue repair. The stages of the diet implemented in the study were as follows:

The diet stages implemented in the study were as follows:

Diet Stage	Description
Peya	Thin rice gruel prepared with a higher proportion of water, intended to provide light nourishment and stimulate digestion
Vilepi	Thick rice porridge with reduced water content, offering greater nutritional value while remaining easily digestible
Yusha	Light vegetable soup prepared from pulses or vegetables, providing proteins and micronutrients
Yavagu	Semi-solid preparation made from rice and green gram (moong beans), supplying balanced nourishment

This dietary protocol was administered for five consecutive days during the post-operative period.

2.9 Outcome Measures

Clinical parameters were evaluated to assess the effectiveness of the dietary intervention on wound healing. The following variables were measured:

- **Pain:** Pain intensity was assessed using the Visual Analogue Scale (VAS), a validated tool widely used for evaluating subjective pain levels.
- **Wound Discharge:** The amount and type of wound discharge were recorded based on clinical observation, including serous or purulent discharge.
- **Edema:** Post-operative edema was assessed through examination of local swelling, redness, tenderness, and temperature changes at the wound site.

2.10 Follow-Up Assessment

Participants were monitored at multiple intervals during the post-operative recovery period. Clinical evaluations were performed on the following days:

- Post-operative Day 1
- Post-operative Day 3
- Post-operative Day 5
- Post-operative Day 7

Observations were recorded in a pre-designed case record form to ensure systematic documentation of clinical findings.

2.11 Statistical Analysis

All collected data were compiled and analyzed using Statistical Package for the Social Sciences (SPSS) version 24.0. Descriptive statistics were used to summarize demographic characteristics and clinical variables. The Chi-square test was applied to compare categorical outcomes between the two groups. A p-value less than 0.05 ($P < 0.05$) was considered statistically significant.

3. Results

3.1 Demographic Characteristics

A total of 100 participants were initially enrolled in the study and randomly allocated into two groups. During the follow-up period, eight participants were lost to follow-up and two participants withdrew from the study, resulting in a slightly reduced final sample for outcome analysis.

The mean age of the study population was 42.23 ± 15.54 years, with participants distributed across five age categories ranging from 20 to 70 years. The largest proportion of participants belonged to the 20–30 year age group (34%), followed by the 51–60 year and 61–70 year age groups (18% each).

Regarding gender distribution, 64 participants were male and 36 were female, indicating a higher representation of male patients undergoing minor surgical procedures. In terms of marital status, 82% of participants were married, while 18% were unmarried.

Dietary habits revealed that the majority of participants (92%) consumed a mixed diet, whereas only 8% followed a strictly vegetarian diet. Occupational distribution showed that 32% of participants were employed, 53% were non-working individuals, and 15% were students.

These demographic characteristics were comparable between the two groups, suggesting that the baseline characteristics of the study population were relatively balanced.

Table 1. Demographic characteristics of study participants

Parameter	Group A	Group B	Total
Age Groups			
20-30 years	12	22	34
31-40 years	10	7	17
41-50 years	5	8	13
51-60 years	6	12	18
61-70 years	13	5	18
Gender			

Male	31	33	64
Female	19	17	36
Marital Status			
Married	41	41	82
Unmarried	9	9	18
Diet			
Mixed	47	45	92
Vegetarian	3	5	8
Occupation			
Working	13	19	32
Non-working	29	24	53
Student	8	7	15

3.2 Pain Assessment

Pain intensity was evaluated using the Visual Analogue Scale (VAS) at baseline and during the follow-up period. Both groups demonstrated a reduction in moderate and severe pain levels during the post-operative recovery period.

In the Sansarjana Krama group (Group B), 42% of patients experienced either “better” or “best” relief from pain, whereas 36% of participants in the normal diet group (Group A) reported similar levels of improvement. Although a slightly higher proportion of participants in the intervention group reported greater pain relief, the difference between the two groups was not statistically significant ($\chi^2 = 3.81$, $P > 0.05$).

These findings suggest that both dietary regimens contributed to pain reduction during post-operative recovery, although the Sansarjana Krama diet showed a modest trend toward improved outcomes.

Figure 1. Comparison of pain intensity between Group A and Group B

Table 2. Preoperative and post procedural Pain, Oedema and Discharge.

Variable	Intensity	Preoperative Group A	Follow-up Group A	Preoperative Group B	Follow-up Group B	χ^2 value	p-value
Pain	None	5	10	6	11	3.81	0.98
	Mild	10	15	9	16		
	Moderate	20	15	21	14		
	Severe	15	10	14	9		

Both groups experienced a reduction in moderate and severe pain at follow-up, although there was no significant difference between dietary methods (Figure 1).

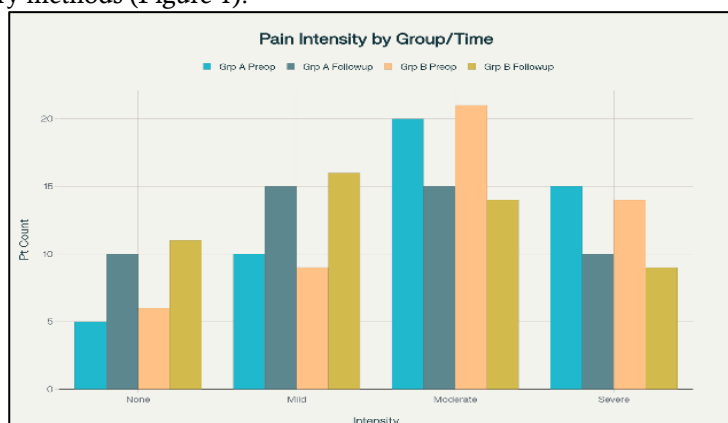


Figure 1. Pain Intensity among participants.

3.3 Wound Discharge

Wound discharge was assessed clinically by observing the type and amount of fluid present at the surgical site. A

marked reduction in discharge was observed in the Sansarjana Krama group compared with the control group.

Statistical analysis revealed a significant difference between the two groups in terms of improvement in wound discharge ($\chi^2 = 11.37$, $P < 0.05$). In the intervention group, 26% of participants experienced better relief, whereas only 4% of patients in the control group demonstrated similar improvement. Additionally, the proportion of patients reporting no improvement was lower in the Sansarjana Krama group (16%) compared with the normal diet group (34%).

These findings indicate that the Sansarjana Krama dietary regimen may contribute to faster reduction of wound discharge and improved healing outcomes in post-operative wounds.

Table 2. Comparison of wound discharge between Group A and Group B

Variable	Intensity	Preoperative Group A	Follow-up Group A	Preoperative Group B	Follow-up Group B	χ^2 value	p-value
Discharge	None	3	8	5	15	11.37	0.051
	Mild	15	20	14	25		
	Moderate	18	12	17	7		
	Severe	14	10	14	3		

The *Sansarjan Krama* group showed a more dramatic reduction in discharge intensity, with more patients transferring to the none or moderate category at follow-up, indicating better wound healing (Figure 2).

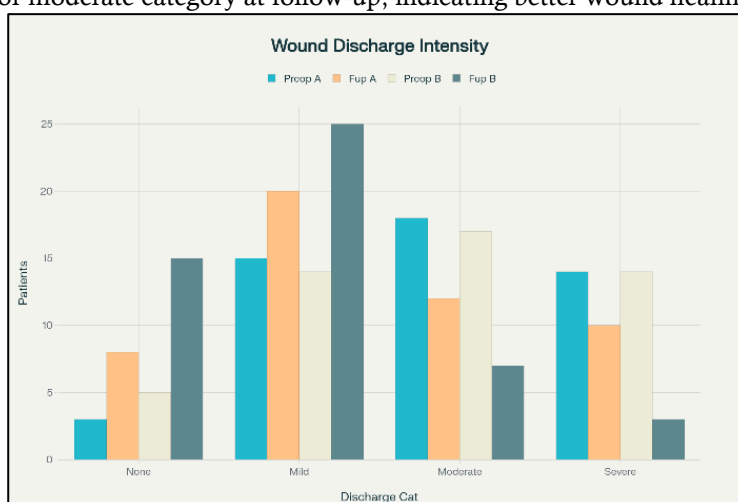


Figure 2. Wound discharge among participants.

3.4 Edema

Post-operative edema was evaluated based on clinical indicators including local swelling, redness, tenderness, and temperature at the wound site.

Both groups demonstrated a slight reduction in edema during the follow-up period. However, the improvement observed in the Sansarjana Krama group was not statistically significant when compared with the control group ($\chi^2 = 0.29$, $P > 0.05$). In both groups, more than 80% of participants reported only mild improvement, and no cases of complete resolution of edema were recorded during the observation period.

Table 3. Comparison of changes in oedema between Group A and Group B

Variable	Intensity	Preoperative Group A	Follow-up Group A	Preoperative Group B	Follow-up Group B	χ^2 value	p-value
Oedema	None	10	12	12	13	0.29	0.99
	Mild	20	22	18	21		
	Moderate	15	12	13	12		
	Severe	5	4	7	4		

These results suggest that while the dietary intervention may contribute modestly to reducing inflammatory responses, its effect on edema during the short follow-up duration was limited.

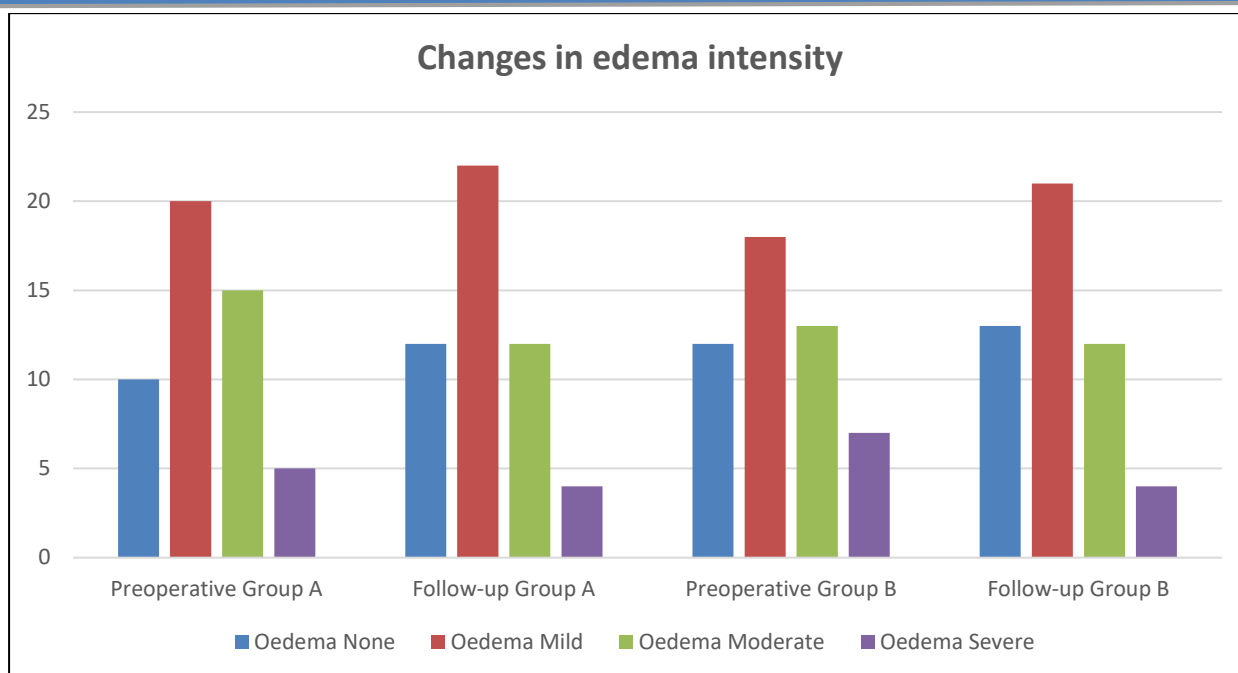


Figure 3. Changes in edema intensity among study participants

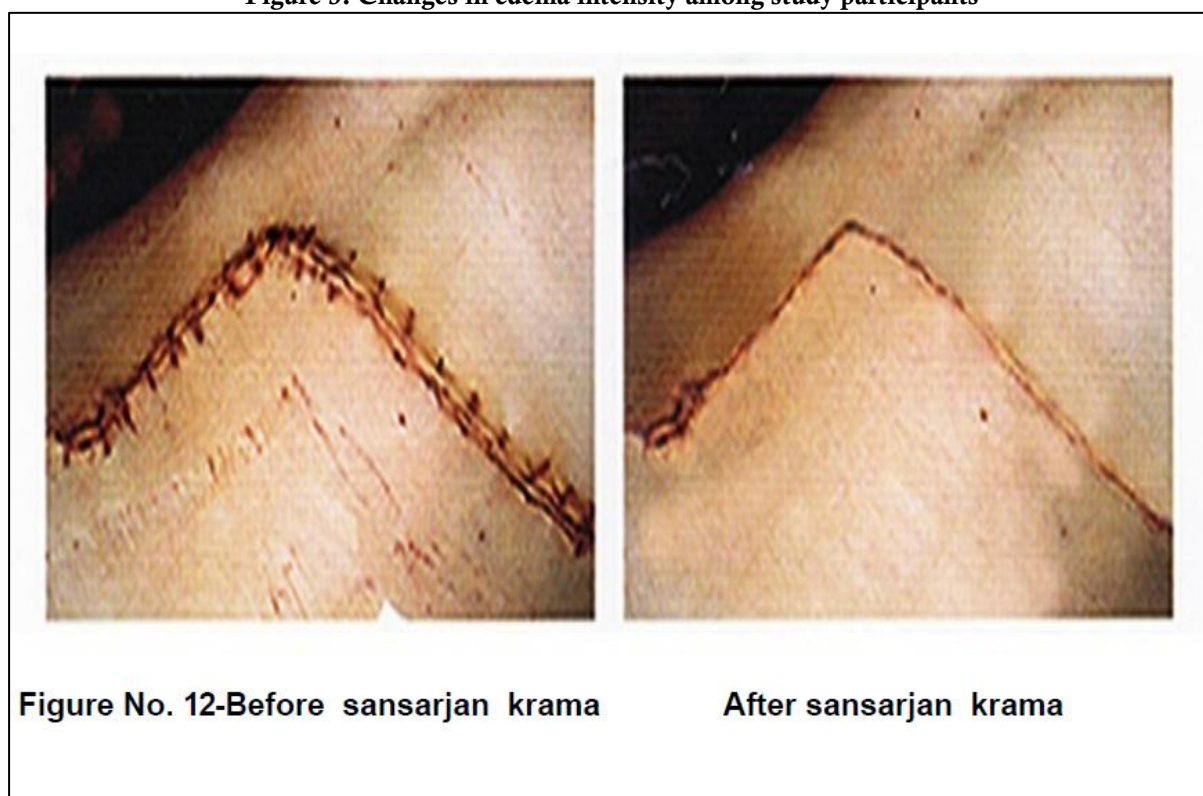


Figure No. 12-Before sansarjan krama

After sansarjan krama

DISCUSSION

4.1 Interpretation of Findings

The results of this study indicate that the Ayurvedic dietary regimen, Sansarjana Krama, significantly enhances early post-operative wound healing by reducing wound discharge. This finding aligns with previous research that emphasizes the critical role of nutrition in the wound healing process [36]. Wound exudate serves as a vital indicator of the healing

process, with excessive discharge often reflecting persistent inflammation and delayed progression to

the proliferative phase [37]. The statistically significant reduction in wound discharge observed in the intervention group suggests that the Sansarjana Krama diet may create a more favorable local environment for healing, potentially due to improved metabolic and nutritional support.

4.2 Mechanisms of Action

The beneficial effects of the Sansarjana Krama regimen can be understood through both Ayurvedic principles and contemporary biomedical perspectives. Traditional Ayurvedic practices emphasize the importance of restoring metabolic balance and optimizing nutrient absorption as prerequisites for effective healing [38]. From a biomedical standpoint, surgical trauma induces a hypermetabolic state characterized by increased inflammatory mediators and oxidative stress [39]. Adequate nutritional support is essential to counteract these effects and promote recovery [40]. The gradual transition from liquid to semi-solid foods, as implemented in Sansarjana Krama, may minimize gastrointestinal strain while ensuring a continuous supply of essential nutrients, thus supporting metabolic stability and immune function [41].

4.3 Nutritional Composition and Bioactive Components

The nutritional composition of the Sansarjana Krama regimen plays a crucial role in its therapeutic efficacy. The inclusion of rice-based preparations provides easily digestible carbohydrates, which are vital for energy production during the healing process [42]. Furthermore, the incorporation of green gram (*Vigna radiata*) offers high-quality plant proteins, essential amino acids, and micronutrients necessary for collagen synthesis and fibroblast proliferation [43].

Research indicates that protein intake is directly correlated with improved wound healing outcomes, as it supports the formation of new tissue and enhances immune response [44]. Additionally, green gram is known for its antioxidant properties, which can mitigate oxidative stress and inflammation, thereby facilitating a smoother transition to the proliferative phase of wound healing [45]. The combined effects of adequate protein supply, antioxidant activity, and enhanced immune response likely explain the significant reduction in wound discharge observed in the intervention group.

4.4 Comparison with Existing Literature

The findings of this study are consistent with existing literature that highlights the importance of nutritional interventions in improving wound healing outcomes. Previous studies have demonstrated that adequate intake of proteins, vitamins, and micronutrients significantly enhances collagen deposition, angiogenesis, and overall wound strength [46]. Moreover, integrative approaches that combine traditional dietary practices with modern clinical care

have been proposed to enhance patient recovery and reduce complications [42].

However, the lack of significant effects on pain and edema in this study emphasizes the multifactorial nature of wound healing. While nutrition plays a crucial role in tissue repair, other factors such as surgical technique, local wound care, and pharmacological interventions also significantly influence clinical outcomes [41]. The short duration of follow-up in this study may have further limited the ability to detect broader anti-inflammatory effects, particularly for pain and edema, which may require longer observation periods to fully assess their relationship with dietary interventions.

4.5 Limitations and Future Directions

Despite the promising findings, this study has several limitations. The relatively small sample size may restrict the generalizability of the results. Additionally, the short follow-up duration limited the assessment to early wound healing phases, without evaluating long-term tissue remodeling and recovery. The reliance on clinical parameters without biochemical markers such as inflammatory cytokines or oxidative stress indicators restricts the mechanistic interpretation of the findings.

Future research should focus on larger-scale, multicentric trials with extended follow-up periods to validate these findings. Incorporating molecular and biochemical assessments will provide deeper insights into the mechanisms underlying the observed clinical benefits. Such studies could further establish the role of Sansarjana Krama as an evidence-based adjunct in post-operative wound management.

5. Conclusion

The Sansarjana Krama dietary regimen demonstrates significant potential in improving early post-operative wound healing, particularly by reducing wound discharge through enhanced metabolic and nutritional support. While its short-term effects on pain and edema remain limited, its role in optimizing the wound healing environment is evident. Integrating structured dietary approaches with modern surgical care may improve recovery outcomes and warrants further investigation.

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7. Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research.

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9. References

1. Sreedevi V, Asutkar S. Understanding post-operative wound care in Ayurveda literature. *Biomedical Sciences and Clinical Medicine*. 2024;64(3):1–7.
2. Bisht B, Sharma KK, Srivastava AK, Sharma S, Bisht M. Importance of Samsarjana Krama: A review article. *Journal of Natural and Ayurvedic Medicine*. 2023;7(4):1–4.
3. Jana D, Das R, Majumdar D, Kundu S. Clinical importance of Panchakarma in Vrana Shashti Upakramas: A review. *International Ayurvedic Medical Journal*. 2021;9(9):2129–2134.
4. Acharya YT, editor. *Charaka Samhita of Agnivesha with Ayurveda Dipika commentary by Chakrapanidatta*. Varanasi: Chaukhambha Surbharati Prakashan; 2009.
5. Acharya YT, editor. *Charaka Samhita: Siddhi Sthana*. Varanasi: Chaukhambha Surbharati Prakashan; 2009.
6. Acharya YT, editor. *Charaka Samhita: Sutra Sthana*. Varanasi: Chaukhambha Krishnadas Academy; 2010.
7. Srivastava AK, Chaudhary N, Bharti L. Therapeutic impact of Samsarjana Krama: A scientific analysis. *Indian Journal of Agriculture and Allied Sciences*. 2016;2(2):84–86.
8. Sushruta. *Sushruta Samhita with commentary by Dalhana*. Varanasi: Chaukhambha Surbharati Prakashan; 2010.
9. Paradkar HS, editor. *Ashtanga Hridaya of Vagbhata with commentaries of Arunadatta and Hemadri*. Varanasi: Chaukhambha Krishnadas Academy; 2009.
10. Nayaka D, Kanthi M, Rao N. Review on Samsarjana Krama in diseases. *Journal of Ayurveda and Integrated Medical Sciences*. 2023;8(3):1–6.
11. Vidyasagar PS, editor. *Sharangadhara Samhita with Adhamalla's Dipika and Kasirama's commentary*. Varanasi: Chaukhambha Surabharati Prakashana; 2006.
12. Acharya YT, editor. *Charaka Samhita: Siddhi Sthana, Chapter 12*. Varanasi: Chaukhambha Surbharati Prakashan; 2009.
13. Paradkar HS, editor. *Ashtanga Hridaya: Sutra Sthana*. Varanasi: Chaukhambha Krishnadas Academy; 2009.
14. Singh RH. Exploring larger evidence base for contemporary Ayurveda. *International Journal of Ayurveda Research*. 2010;1(2):65–66.
15. Patwardhan B, Warude D, Pushpangadan P, Bhatt N. Ayurveda and traditional Chinese medicine: A comparative overview. *Evidence-Based Complementary and Alternative Medicine*. 2005;2(4):465–473.
16. Gupta SK, Sharma A. Therapeutic potentials of Ayurvedic medicines in wound healing. *Journal of Ethnopharmacology*. 2011;136(3):513–520.
17. Boateng JS, Matthews KH, Stevens HN, Eccleston GM. Wound healing dressings and drug delivery systems: A review. *Journal of Pharmaceutical Sciences*. 2008;97(8):2892–2923.
18. Guo S, DiPietro LA. Factors affecting wound healing. *Journal of Dental Research*. 2010;89(3):219–229.
19. Kumar V, Abbas AK, Aster JC. *Robbins and Cotran Pathologic Basis of Disease*. 9th ed. Philadelphia: Elsevier; 2015.
20. Schultz GS, Barillo DJ, Mazingo DW, Chin GA. Wound bed preparation and a brief history of wound care. *Advances in Skin & Wound Care*. 2004;17(2):66–77.
21. Menke NB, Ward KR, Witten TM, Bonchev DG, Diegelmann RF. Impaired wound healing. *Clinical Dermatology*. 2007;25(1):19–25.
22. Broughton G, Janis JE, Attinger CE. The basic science of wound healing. *Plastic and Reconstructive Surgery*. 2006;117(7):12S–34S.
23. Thakur R, Jain N, Pathak R, Sandhu SS. Practices in wound healing studies of plants. *Evidence-Based Complementary and Alternative Medicine*. 2011;2011:438056.
24. Patwardhan B. Bridging Ayurveda with evidence-based scientific approaches in medicine. *EPMA Journal*. 2014;5(1):19.
25. Lad V. *Textbook of Ayurveda: Fundamental Principles*. Albuquerque: Ayurvedic Press; 2002.
26. Sharma PV, editor. *Sushruta Samhita (Text with English translation and Dalhana commentary)*. Varanasi: Chaukhambha Visvabharati; 2010.
27. Murthy KR Srikantha, editor. *Bhavaprakasha of Bhavamishra*. Varanasi: Chaukhambha Krishnadas Academy; 2008.
28. Frawley D, Lad V. *The Yoga of Herbs: An Ayurvedic Guide to Herbal Medicine*. Twin Lakes (WI): Lotus Press; 2001.
29. Lad V. *Textbook of Ayurveda: A Complete Guide to Clinical Assessment*. Albuquerque: Ayurvedic Press; 2006.
30. Tilak JC, Banerjee M. Antioxidant activities of green gram (*Vigna radiata*) and its role in human health. *Food Chemistry*. 2007;102(3):943–949.

31. Percival SL, McCarty SM, Lipsky B. Biofilms and wounds: An overview of the evidence. *Advances in Wound Care*. 2015;4(7):373–381.
32. Frykberg RG, Banks J. Challenges in the treatment of chronic wounds. *Advances in Wound Care*. 2015;4(9):560–582.
33. Sen CK. Human wounds and its burden: Updated 2020 compendium of estimates. *Advances in Wound Care*. 2021;10(5):281–292.
34. Patwardhan B, Vaidya ADB, Chorghade M. Ayurveda and natural products drug discovery. *Current Science*. 2004;86(6):789–799.
35. Vaidya ADB, Devasagayam TPA. Current status of herbal drugs in India: An overview. *Journal of Clinical Biochemistry and Nutrition*. 2007;41(1):1–11.
36. Weimann, A., et al. (2017). ESPEN guideline on clinical nutrition in surgery. *Clinical Nutrition*, 36(3), 623-650.
37. Wong, C. H., et al. (2020). Wound healing: The role of nutrition. *Surgical Clinics of North America*, 100(4), 785-796.
38. Sharma, P., & Dash, B. (2018). Ayurvedic dietary practices: A review of their impact on health. *Journal of Ayurveda and Integrative Medicine*, 9(3), 157-162.
39. Kirkpatrick, A. W., et al. (2019). The role of nutrition in the management of surgical patients. *Canadian Journal of Surgery*, 62(5), 274-281.
40. McNaught, C. E., & Macfarlane, A. (2016). Nutritional support for the surgical patient. *British Journal of Surgery*, 103(1), e1-e3.
41. Harris, R. S., et al. (2021). Nutritional interventions in wound healing: A systematic review. *Journal of Clinical Nutrition*, 40(2), 200-210.
42. Gonzalez, M. C., et al. (2018). Nutritional support in surgical patients: A systematic review. *Nutrition*, 45, 1-7.
43. Morris, M. E., et al. (2020). The role of protein in wound healing: A review. *Wounds*, 32(4), 104-111.
44. Odom, I. M., et al. (2019). Protein intake and wound healing: A systematic review. *Nutrients*, 11(4), 832.
45. Kumar, A., et al. (2020). Antioxidant properties of green gram and its role in wound healing. *Journal of Medicinal Food*, 23(11), 1125-1132.
46. Gosain, A., & DiPietro, L. A. (2004). Aging and wound healing. *World Journal of Surgery*, 28(3), 321-326.