Shatadhauta Ghrita and Panchavalkala Prevent Wound Healing *In Vivo*

Tripti Dewangan [1*], Kishor Kumar Sahu [1]

Abstract

Background: Wounds disrupt the integrity of skin or mucosa, causing significant cellular and vascular damage. Historical and modern research aims to improve wound healing through effective management strategies and therapeutic applications, particularly within traditional systems like Ayurveda. This study evaluates the efficacy of Shatadhauta Ghrita (SDG) combined with Panchavalkala Siddha Ghrita (PSSG) for wound healing, assessing their potential as modern treatments. Methods: Thirty mature Wistar strain albino rats were divided into five groups, including a control and treatment groups receiving SDG, Go-Ghrita (GH), and PSSG. Standardized excision wounds were created, and healing was monitored through wound contraction measurements over 21 days. Results: The control group showed a wound contraction of 91.53% after 15 days, increasing to 95.23% by day 21. The GH group exhibited 93.67%, while the SDG group had 87.95%. Notably, the SDG group demonstrated a contraction of 98.67% by day 21, outperforming both control and GH groups. Conclusion: SDG's superior wound healing efficacy suggests it may serve as an effective topical treatment, supported by traditional Ayurvedic practices. This research emphasizes the importance of integrating traditional knowledge with scientific validation, advocating for further studies on SDG's biological properties and potential applications in modern medicine.

Keywords: Wound healing, Shatadhauta Ghrita, Panchavalkala, Ayurveda, SDG, rat model.

Significance | This study determined the potential of ancient Ayurvedic formulations for modern wound care, promoting effective healing while reducing treatment costs.

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Introduction

Wounds are defined as interruptions in the continuous layer of skin or mucosa, which can be caused by injuries, whether accidental or surgical (Sen, 2021). The disruption of skin integrity leads to cell death, blood vessel damage, leakage of blood components, and reduced oxygen supply to tissues, resulting in hypoxia. Throughout history, humanity has continually sought to address wound healing at various stages of civilization, with research focused on understanding the complex biochemical and cellular processes involved in tissue repair and scar formation (Monika et al., 2022). This knowledge serves as a critical foundation for developing new therapeutic strategies to minimize the detrimental effects of injuries.

Effective wound management necessitates the use of optimal dressing materials that not only expedite healing but also reduce the loss of essential components such as proteins, electrolytes, and fluids from the wound site. Moreover, these dressings should help mitigate inflammation and infection, key factors that can delay the healing process (Tu et al., 2022). The abundance of available wound care treatments in the marketplace has resulted in the widespread use of various products by practitioners, which can sometimes lead to expensive and prolonged therapies.

Topical applications for wound healing have been prominent throughout history, appearing frequently in ancient literary works (Nabeesab Mamdapur et al., 2019). In Ayurvedic literature, Roja et al. (2022) emphasized the formulation of topical remedies,

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highlighting the deep-rooted tradition of external applications for wound care. Ancient texts have noted the importance of addressing wounds that may arise due to imbalances in bodily doshas or as a result of physical injuries (Mansouri, 2023). Numerous traditional topical medications have been described in detail, illustrating their extensive use in treating a variety of skin conditions and wounds (Fazil & Nikhat, 2020).

Plants play a significant role in the wound healing process, aiding the body's natural ability to repair damaged tissue. In recent years, there has been a growing interest in exploring alternative healing molecules derived from traditional systems such as Ayurveda to validate their efficacy in wound care (Dudhamal, 2023). Various herbs have demonstrated remarkable abilities to enhance wound healing, though only a few have been rigorously tested for their therapeutic properties and used effectively in clinical settings.

One prominent Ayurvedic formulation used for external applications is Shatadhauta Ghrita (SDG), which is prepared by repeatedly washing clarified butter (ghee) with cold water a hundred times (Wayal & Gurav, 2020). This formulation has been praised for its exceptional wound healing properties and has been traditionally used to treat conditions such as burning sensations, irritations, erysipelas, and other similar skin disorders (Süt et al., 2020). When combined with Panchavalkala, SDG is believed to enhance the wound healing process significantly (Biswas et al., 2022). The current research aims to evaluate the efficacy of Panchavalkala Siddha SDG Group (PSSG) using experimental methods to understand the roles of both SDG and Panchavalkalas in wound healing (Dhurve & Dudhamal, 2020).

SDG's therapeutic benefits extend beyond wound care. For instance, Rokohl et al. (2020) recommended its use in treating fever-related burning sensations through the method of rinsing ghee a hundred times to produce a light and smooth product. In dermatological contexts, SDG is used to alleviate burning sensations associated with certain skin conditions, further demonstrating its versatility and importance in traditional medicine (Sharma & Kajaria, 2022).

The aim of this study was to determine the traditional formulations like SDG as the potential of ancient remedies in modern wound care. The integration of traditional knowledge with contemporary research could lead to innovative therapeutic approaches that enhance the healing process while reducing complications and treatment costs.

1. Materials and Methods

SDG Preparation

Cow ghee, known as Go-Ghrita, was obtained from Mandavi, Kutch, Gujarat. The Panchavalkala was obtained from the pharmacy located in Jamnagar. Both experimental medications were manufactured according to the established standard procedure. The Panchavalkala Kwatha was made by heating a mixture of 1 part Coarse flour of Panchavalkala and eight water areas. The liquefied clarified butter was mixed with an equal quantity of reverse osmosis water using a manual stirring device for approximately 8-10 minutes. The surplus water was poured out and carried out 100 times. The same protocol was used to prepare the other experimental medication, substituting the mixture with water. The completed item was designated as SDG. Betadine served as the benchmark pharmaceutical.

The preparation process involves repeatedly rinsing cow ghee, or Ghrita, with water to transform it into a smooth, soothing balm that functions as both a moisturizer and an anti-aging cream. The method consists of warming the ghee and immersing it in clean water, discarding the used water after each rinse. This cycle is repeated for a total of 100 washes, ensuring thorough purification and emulsification.

The process begins by adding water to a shallow jar containing warm ghee, followed by a kneading action to facilitate the washing. After 2-3 minutes of kneading, excess water is drained, and the rinsing is repeated. Throughout this process, the ghee undergoes significant physical and chemical changes, transitioning from a homogeneous mixture to an oil-in-water emulsion. The repeated agitation reduces the size of fat globules and allows for the integration of water droplets, potentially leading to complex emulsion structures.

As the washing continues, pigments may leach into the water, altering the color of the ghee (known as Dhauta). Hydrolysis of triglycerides occurs, converting them into glycerol in the aqueous environment. This transformation is critical, as it enhances the moisturizing properties of the final product. The resulting SDG is a rich, nourishing lotion effective for treating conditions such as wounds, skin irritation, and herpes. The preparation process is illustrated in Figure 1, while changes in ghee during washing are shown in Figure 2. Figure 3 depicts the overall transformation of ghee into SDG.

Animal Study Design

Thirty mature Wistar strain albino rats, aged 11 to 18 weeks and weighing 225 ± 50 g, were selected for this study. The rats were housed in controlled environmental conditions, maintained at a temperature of 23 ± 0.5°C and humidity levels between 50% and 75%, with a 12-hour light and dark cycle. All animals were kept in identical conditions and provided standard feed and unrestricted access to water. The study protocol was approved by the Institutional Animal Ethics Committee.

Dosage Schedule

The rats were randomly divided into five groups, each consisting of six individuals, and housed in separate cages. The first group served as the control (C), the second group received Go-Ghrita (GH), the third group was treated with Shatadhauta Ghrita (SDG), and the fourth group was administered Panchavalkala Siddha Ghrita (PSSG). The fifth group acted as the standard baseline, receiving

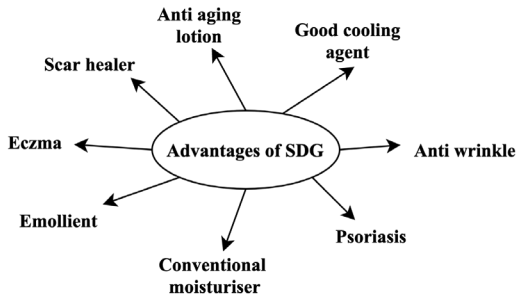

Figure 1. Advantages of Shatadhauta Ghrita (SDG) in wound healing, highlighting its moisturizing, cooling, and anti-inflammatory properties, as well as its effectiveness in enhancing scar healing.

Figure 2. Preparation process of Shatadhauta Ghrita (SDG), detailing the method of repeatedly washing cow ghee with water to achieve the final emulsion suitable for topical application.

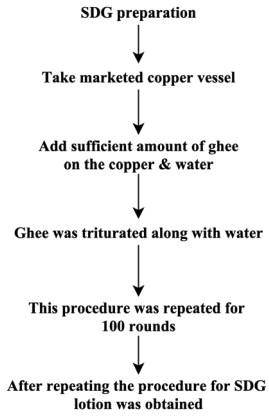

Figure 3. Workflow of the SDG process, illustrating the steps involved in preparing SDG and its application for wound care.

Table 1. Results of wound healing study comparing the efficacy of various treatments, including Control, Go-Ghrita (Ghee), Shatadhauta Ghrita (SDG), Panchavalkala Siddha Ghrita (PSSG), and Reference Standard (RS). The table presents wound sizes measured in square millimeters across different time points (1, 3, 6, 10, 12, 15, 18, and 21 days), percentage changes in wound area, and total days taken for complete healing.

Number of days	Control	Ghee	SDG	PSSG	RS
1 day	342.39	364.02	325.71	384.98	321.35
3 day	273.58	302.23	257.52	315.75	215.66
6 day	217.71	251.22	186.75	256.8	194.79
10 day	132.27	103.65	87.8	121.22	132.99
12 day	47.51	26.24	42.79	57.82	64.62
15 day	24.1	17.78	42.86	36.87	26.86
% of change (0-18)	91.53	93.67	87.95	84.69	90.66
18 day	16.36	12.05	8.98	22.54	13.91
21 day	11.63	14.13	5.6	17.7	11.14
% of change (0 - 21)	95.23	94.75	98.67	92.83	94.57
Days taken for wound healing	24.67	22.2	21.63	25.77	27.71

Betadine. Each group received their respective treatments and the vehicle daily, covering the entire wound area. Prior to application, the wounds were cleaned with normal saline. The size of the wounds was measured before treatment on day one and subsequently at three-day intervals using a tracing sheet. Wound areas were quantified in square millimeters using graph paper, and the time required for complete healing was recorded.

Surgical Procedure

Prior to the surgical procedures, all instruments (scissors, forceps, etc.) were sterilized through autoclaving. The rats were anesthetized using diethyl ether before the excision wounds were created following a standardized protocol. The ventral fur of the rats was removed, and the area for the injury was marked on their backs with a round coin. A circular excision wound with a diameter of 35 ± 5 mm and a depth of 3 mm was made using a surgical blade according to the marked outline.

Results and Discussion

The results indicated a marginally enhanced rate of wound contraction in the experimental groups compared to the control group during the initial three days of the study, with minimal differences observed among the various treatment groups. After 15 days, the control group exhibited a wound contraction rate of 91.53%, which increased to 95.23% by day 21. In contrast, the Go-Ghrita (GH) group showed a contraction of 93.67% after 15 days, while the conventional control group recorded a slightly higher shrinkage of 94.75%. The Shatadhauta Ghrita (SDG) group demonstrated a contraction rate of 87.95%, while the Panchavalkala Siddha Ghrita (PSSG) group showed a shrinkage of 92.83%. Notably, by day 21, the SDG group exhibited a significant contraction rate of 98.67%, surpassing the control (91.53%) and GH (95.23%) groups (Table 1).

The Reference Standard (RS) group completed the wound healing process in 21 days, while the control, GH, and SDG groups required approximately 23 days for full recovery. The PSSG group took around 26 days to heal completely (Table 1). These findings suggest that SDG not only promotes wound contraction but also accelerates the healing process compared to standard treatments, which is particularly noteworthy considering its traditional use in Ayurvedic practices.

Ayurveda, as an ancient system of medicine, possesses a rich historical context, and its fundamental principles continue to hold significant relevance today. The increasing recognition of the need for scientific validation of Ayurvedic practices is crucial in bridging traditional knowledge with modern scientific methodologies. The ongoing pursuit of new knowledge through research, advancement, and exploration of novel applications is essential to establish the safety, quality, and efficacy of Ayurvedic treatments.

The method of preparing SDG, which involves washing ghee 100 times, has long been utilized in Ayurvedic medicine, yet its potential for contemporary therapeutic applications remains underexplored. This study aimed to investigate the efficacy of SDG as a medium for topical medication delivery, positioning it as a promising alternative to conventional ointments. Future research that combines herbal medicines or phytoconstituents with SDG could lead to the development of effective herbal formulations that might serve as viable substitutes for traditional ointments.

The effectiveness of SDG has been corroborated by chemical analyses and aligns with the principles of Samskara Siddhanta in Ayurveda. It is recognized for its exceptional cooling properties, efficient lubrication, and moisturizing capabilities, as well as its remarkable ability to promote scar healing. Despite its extensive use in Ayurvedic practices, SDG's integration into modern medical frameworks has been limited. Therefore, this research underscores the necessity for empirical studies to validate SDG's biological effects and safety, as well as to establish standardized protocols for its application. Ultimately, the impact of SDG should be supported by contemporary evidence in addition to historical documentation, facilitating its acceptance and utilization in modern therapeutic practices.

Conclusion

In conclusion, this study highlights the significant potential of Shatadhauta Ghrita (SDG) and Panchavalkala in enhancing wound healing through the integration of traditional Ayurvedic practices with modern scientific methodologies. The results demonstrated that SDG not only promotes effective wound contraction but also accelerates the overall healing process, surpassing conventional treatments. As Ayurveda continues to gain recognition, the need for scientific validation of its practices is paramount. By exploring ancient formulations like SDG, we can bridge the gap between traditional knowledge and contemporary medical applications. Future research should focus on empirical studies to further elucidate the therapeutic properties of these formulations, ensuring their safe and effective incorporation into modern wound care strategies. The findings emphasize the importance of acknowledging and validating traditional remedies, potentially leading to innovative approaches that enhance healing outcomes and reduce treatment costs in contemporary medicine

Author contributions

TD and KKS contributed to conceptualization, fieldwork, data analysis, drafting the original manuscript, editing, funding acquisition, and manuscript review. Both TD and KKS were involved in research design, methodology validation, data analysis, visualization, and manuscript review and editing. Additionally, TD took the lead in methodology validation, investigation, funding acquisition, supervision, and final revisions. All authors have reviewed and approved the final version of the manuscript.

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Competing financial interests

The authors have no conflict of interest.

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