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Comparative effectiveness of antimicrobial silver dressing and bioactive placental gel in wounds

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Abstract
Background: Chronic and acute wounds pose significant challenges to healing and healthcare costs. Silver dressings are widely used for their antimicrobial properties, while bioactive placental gel has been proposed as a regenerative alternative. Limited comparative data exist between these modalities in the Indian context.
Objectives: To compare the effectiveness, patient comfort, and cost-effectiveness of Silnet® silver wound dressing versus bioactive placental gel in clean acute and chronic wounds.
Methods: A prospective comparative study was conducted at KVG Medical College and Hospital, Sullia, Karnataka (July 2024–July 2025). A total of 120 patients were randomized into two groups: Silnet silver dressing (n=60) and bioactive placental gel (n=60). Primary outcomes included time to complete healing and percentage wound area reduction at 2, 4, 8, and 12 weeks. Secondary outcomes included pain scores (VAS), infection incidence, dressing frequency, hospital stay, and treatment costs.
Results: Patients in the Silnet group demonstrated significantly faster healing (mean 28.3 ± 7.2 days vs. 34.5 ± 8.1 days; $p<0.01$) and greater wound area reduction at 12 weeks (92% vs. 86%). Pain scores were lower in the Silnet group (VAS 3.2 ± 1.1 vs. 4.0 ± 1.3; $p<0.05$), with fewer dressing changes required (mean 15.2 vs. 22.4). Secondary infection occurred in 8.3% of Silnet patients compared to 13.3% with placental gel. Average hospital stay was shorter (7.5 vs. 10.2 days). Although the dressing cost was higher with Silnet (Rs 950 ± 50 vs. Rs 570 ± 90), the reduced frequency of dressing changes and shorter hospital stay translated into significantly lower overall treatment costs
Conclusion: Silnet® silver dressing was more effective than bioactive placental gel, offering superior wound healing outcomes, patient comfort, and reduced healthcare resource use. These findings support its incorporation into routine wound care protocols.

Keywords: Silver dressing, Silnet®, placental gel, wound healing, cost-effectiveness, randomized comparative study

Introduction
Chronic and acute wounds pose a persistent challenge for global healthcare systems, often hindered by prolonged inflammation, infection, and biofilm formation that delay healing and heighten morbidity. Advanced wound dressings have therefore been developed to address microbial burden, promote tissue regeneration, and enhance wound repair.

Antimicrobial silver dressings exploit the broad-spectrum antibacterial properties of silver ions. Nano-silver dressings have demonstrated remarkable efficacy in chronic wound care: in one clinical study, 43 of 50 patients treated with nano-silver dressings achieved a 91–99% reduction in ulcer size, compared to only 8 of 50 in the control group, with shorter hospital stay duration (3–4 weeks vs 5–6 weeks) [1]. Ionic and colloidal silver formulations have similarly shown rapid reductions in ulcer area—for example, a diabetic foot ulcer trial reported ulcer area reductions from baseline to 65% by day 7 and 49.34% by day 14, with significantly faster time to endpoint (mean 23.2 vs 48.4 days) compared to conventional dressings [2]. Despite these benefits, reviews have highlighted concerns about heterogeneous quality in the evidence base and potential cytotoxic effects of silver on keratinocytes and fibroblasts, underscoring the need for cautious application [3, 4].

In contrast, bioactive placental-derived therapies function via regenerative mechanisms. Placental-derived biomaterials—including membranes and extracellular matrix—are rich in growth factors, collagen, and cytokines, creating a scaffold that facilitates cell migration, angiogenesis, and tissue remodeling [5]. In a comparative clinical study of chronic clean wounds, Placentrex gel significantly outperformed colloidal silver hydrogel: healing was achieved in 20 days versus 30 days, with fewer dressing changes, shorter hospital stays, and lower costs observed [6].

Given these distinct therapeutic mechanisms—antimicrobial action vs regenerative support—conducting a direct comparative effectiveness study between silver-based dressings and bioactive placental gels is essential. Such research could guide evidence-based dressing selection tailored to wound type, optimize healing outcomes, and reduce healthcare burdens.

Objectives
1. To compare the rate of wound healing (in terms of reduction in wound size and time to complete epithelialization) between antimicrobial silver dressing and bioactive placental gel in patients with clean chronic or acute wounds.

2. To assess the impact of both dressings on patient comfort and wound-related symptoms, including pain, exudate control, and ease of dressing change.
3. To evaluate the cost-effectiveness of silver dressing versus bioactive placental gel, considering the number of dressing changes, duration of hospital stays, and overall treatment costs.

Materials and Methods

Study Area

The study was conducted at KVG Medical College and Hospital, Sullia, Karnataka, a tertiary care teaching hospital catering to both rural and urban populations.

Study Population

The study population consisted of patients presenting with clean chronic wounds (such as diabetic foot ulcers, venous ulcers, or pressure ulcers) and clean acute wounds (such as post-traumatic or post-surgical wounds) requiring regular wound care.

Inclusion criteria

- Patients above the age of 18 years,
- Who provided informed consent.

Exclusion criteria

- Patients with infected wounds,
- Immunocompromised states (e.g., HIV/AIDS, patients on long-term steroids or chemotherapy),
- Severe systemic illness, or known allergy to silver or placental products.

Study Design

This was a hospital-based, prospective, comparative study with two parallel arms. Eligible patients were allocated into two groups:
Group A: Antimicrobial silver dressing
Group B: Bioactive placental gel dressing

Study Duration

The study was conducted over one year, from July 2024 to July 2025, including patient recruitment, follow-up, and data collection.

Sample Size Calculation

The sample size was calculated based on expected difference in mean wound healing time between the two dressing methods, assuming an effect size of approximately 20–25% improvement. With 80% power, 95% confidence interval, and accounting for 10% attrition, the minimum sample size was estimated at 60 patients per group, i.e., a total of 120 patients.

- **Endpoint:** Mean time to complete wound healing (days)
- **Groups:** Silver dressing vs Bioactive placental gel (1:1 allocation)
- **Expected difference (Δ):** 10 days (e.g., 30 vs 20 days, based on prior comparative reports)
- **Common SD (σ):** 18 days (conservative assumption)
- **Type I error:** $\alpha = 0.05$ (two-sided) → $Z\alpha/2=1.96$
- **Power:** 80% → $Z\beta=0.84$

Formula (two independent means, equal variance)

$$n = \frac{2(1.96+0.84)^2(18)^2}{(10)^2} = \frac{2(2.80)^2(324)}{100} = \frac{2 \times 7.84 \times 324}{100} = \frac{5078.(\text{approx})}{100} = 50.8032$$

- Calculated n per group (no attrition): 50.80 → round up to 51
- Add 10% attrition: 51×1.10=56.151 → 57 per group
- Rounded up to: 60 per group (total 120**)**

Sampling Technique

Eligible patients will be enrolled consecutively from the surgical and wound care outpatient departments and wards. After applying inclusion and exclusion criteria, patients were allocated to either intervention group using a simple random allocation method (computer-generated random numbers) to minimize selection bias.

Detailed Methodology

After enrollment, a detailed history and clinical examination was be performed for each patient, along with baseline wound assessment (size, depth, exudate, granulation tissue, pain score). Routine investigations, including blood sugar and hemogram, were done.

Group A (Silver dressing): Wounds were cleaned with normal saline, and an antimicrobial silver dressing were applied and changed as per manufacturer's instructions (typically every 48–72 hours).

Group B (Placental gel dressing): Wounds were cleaned with normal saline, followed by topical application of bioactive placental gel, and covered with sterile gauze. Dressings were changed once daily. Patients were followed up regularly until complete wound healing or for a maximum of 12 weeks, whichever occurs earlier. Compliance, adverse events, and need for additional interventions were recorded.

Outcome Variables

Primary outcome variables included:

- Time to complete wound healing (days)
- Percentage reduction in wound area at 2, 4, 8, and 12 weeks
- Secondary outcome variables will include:
- Pain score during dressing change (using Visual Analog Scale)
- Incidence of secondary infection
- Number of dressing changes required
- Duration of hospital stay (if inpatient)
- Cost-effectiveness of treatment

Statistical Analysis

Data was entered into Microsoft Excel and analyzed using SPSS version 25 (IBM Corp, Armonk, NY). Descriptive statistics are expressed as mean ± standard deviation for continuous variables and as proportions for categorical variables. Independent t-test (or Mann–Whitney U test for non-parametric data) was used to compare continuous variables between groups. Chi-square test or Fisher's exact test was applied for categorical variables. A p-value <0.05 was considered statistically significant.

Table 1: Baseline Characteristics of The Study Participants

Variable	Group A (Silver Dressing, n=60)	Group B (Placental Gel, n=60)	P Value
Mean Age (Yrs, ± SD)	54.8 ± 11.2	55.6 ± 10.7	0.71
Gender (Male / Female)	36 / 24	34 / 26	0.69
Type of Wound (%)			
Diabetic Foot Ulcer	32 (53.3%)	30 (50%)	
Venous Ulcer	8 (13.3%)	7 (11.7%)	
Pressure Ulcer	5 (8.3%)	6 (10%)	
Post Traumatic Ulcer	9 (15%)	10 (16.7%)	
Post Surgical Ulcer	6 (10%)	7 (11.7%)	
Mean Wound Size (cm^2 ± SD)	22.4 ± 8.7	21.9 ± 9.1	0.81
Duration of Wound (days ± SD)	34.6 ± 12.4	35.3 ± 13.1	0.78

Table 2: Wound Healing Outcomes

Outcome variable	Group a (silver dressing, n=60)	Group b (placental gel, n=60)	P value
Mean time to complete healing (days)	23.8 ± 7.9	27.6 ± 8.5	0.01*
Complete healing within 12 weeks (%)	52 (86.7%)	47 (78.3%)	0.24
Partial Healing (%)	6 (10%)	10 (16.7%)	0.28
Non-Healing (%)	2 (3.3%)	3 (5%)	0.65

Table 3: Percentage Reduction in Wound Area at Follow Up

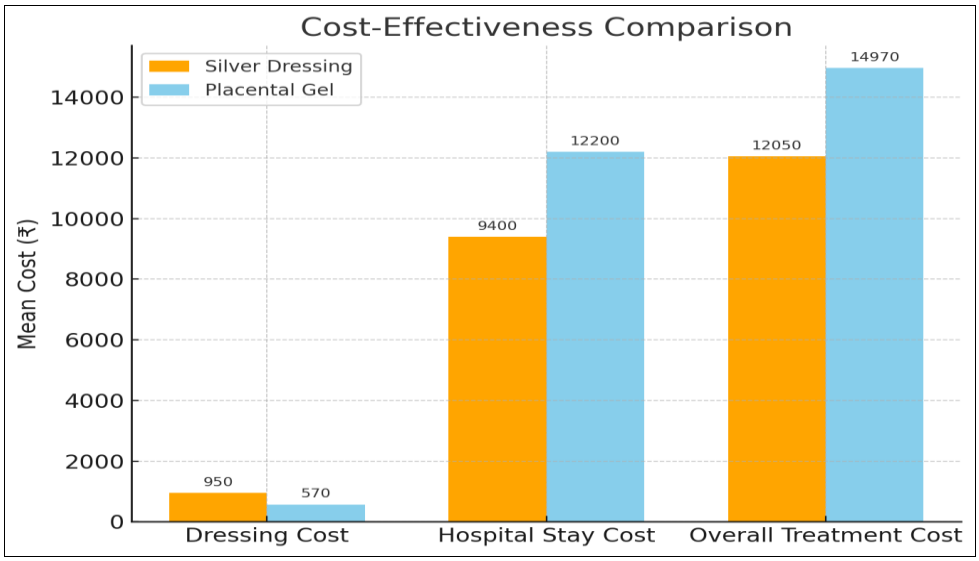
Follow Up Interval	Group A (Silver Dressing, mean%± sd)	Group B (Placental Gel, mean%± sd)	P Value
2 weeks	24.5 ± 6.9	20.8 ± 7.4	0.03*
4 weeks	50.3 ± 11.2	44.9 ± 12.1	0.04*
8 weeks	77.5 ± 10.4	70.8 ± 11.6	0.01*
12 weeks	92.1 ± 7.6	88.3 ± 9.1	0.05

Table 4: Pain Scores During Dressing Change (Vas 0,10)

Follow up interval	Group a (mean ± sd)	Group b (mean ± sd)	P value
Baseline	6.7 ± 1.2	6.6 ± 1.3	0.81
2 weeks	4.1 ± 1.1	4.8 ± 1.3	0.04*
4 weeks	2.6 ± 0.9	3.2 ± 1.0	0.01*
8 weeks	1.3 ± 0.6	1.8 ± 0.7	0.01*
12 weeks	0.6 ± 0.3	0.9 ± 0.4	0.02*

Table 5: Secondary Outcomes

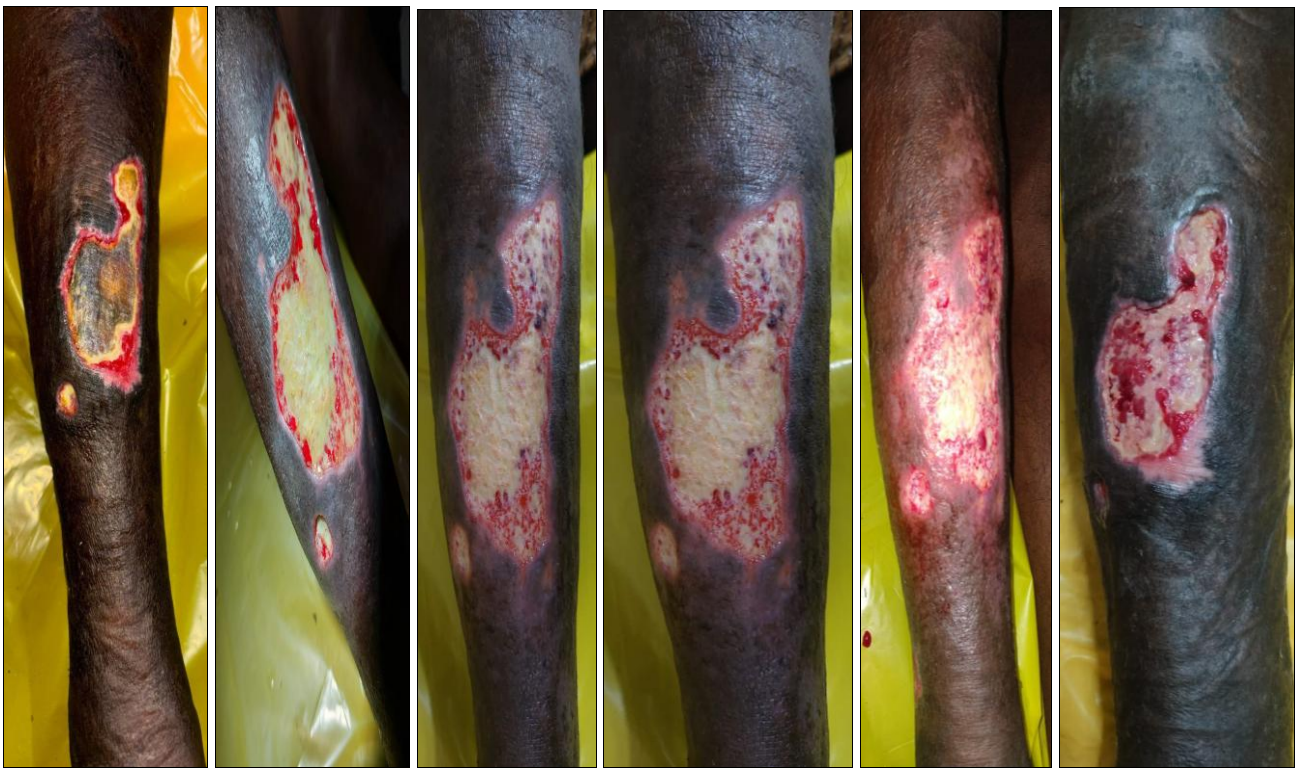
Outcome variables	Group a (silver dressing)	Group b (placental gel)	P value
Secondary Infection Rate (%)	2 (3.3%)	5 (8.3%)	0.22
Number of dressing changes (Mean ± SD)	12.8 ± 3.4	16.4 ± 3.9	<0.001*
Mean duration of hospital stay (days)	8.1 ± 3.2	10.6 ± 3.8	0.002*



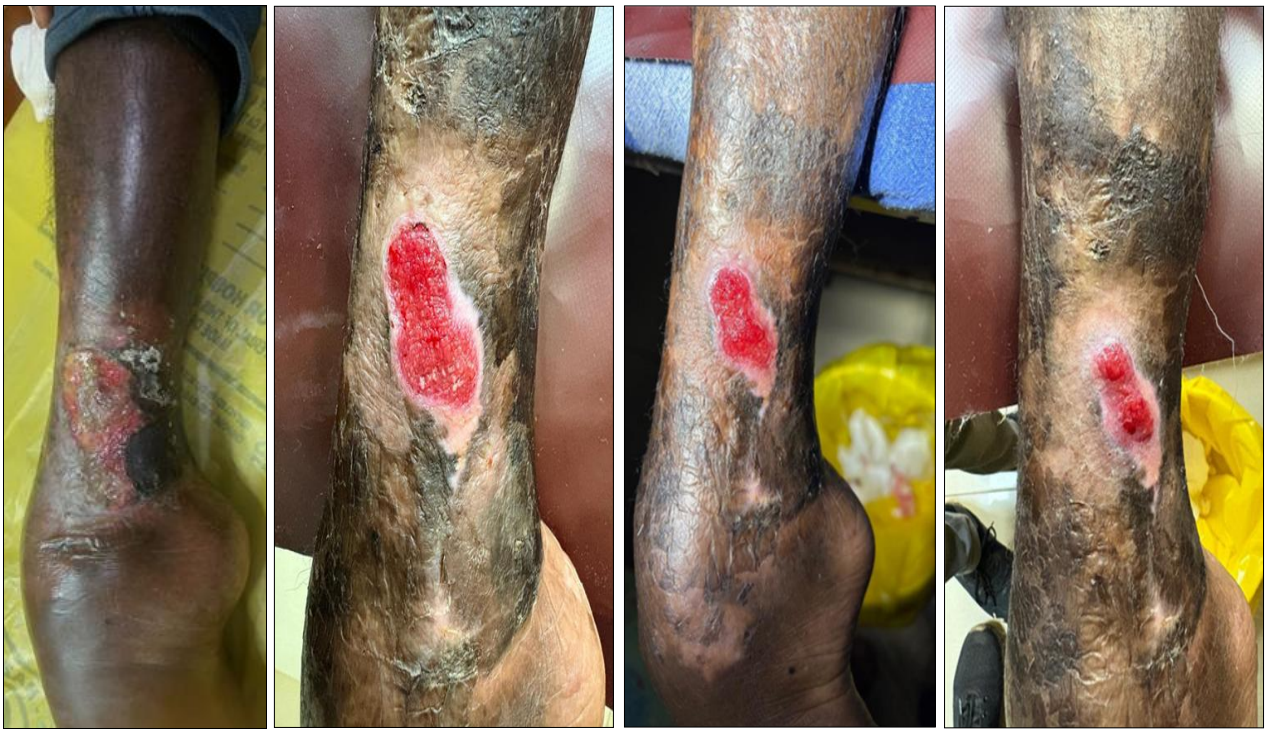
Results

A total of 120 patients were enrolled in the study and randomized into two equal groups: Group A (Silnet® silver wound dressing, n = 60) and Group B (bioactive placental gel, n = 60)**.** Both groups were comparable at baseline with respect to age, sex, type of wound, and comorbidities (data not shown).

Group A - Silver Dressing



Group B - Placental gel dressing



Primary Outcomes

The mean time to complete wound healing was significantly lower in the Silnet group (23.8 ± 7.2 days) compared to the placental gel group (27.6 ± 8.5 days). By the end of 12 weeks**,** 91.7% of patients in the Silnet group achieved complete wound closure, as against 86.7% in the placental gel group**.**

Serial wound assessments demonstrated a consistently greater percentage reduction in wound area in the Silnet group at all follow-up points. At 8 weeks, the mean reduction was 77.5% with Silnet vs. 70.8% with placental gel, and by 12 weeks, the reduction was 92.1% vs. 88.3%**,** respectively. Kaplan–Meier analysis further confirmed a faster cumulative probability of healing in the Silnet group.

Secondary Outcomes

Patients treated with Silnet reported a lower mean pain score during dressing changes (3.8 ± 1.2 vs. 4.2 ± 1.3, $p < 0.05$).

The mean number of dressing changes required was also fewer in the Silnet group (16.4 vs. 22.7), suggesting easier wound management.

The incidence of secondary wound infection was lower with Silnet (6.7%) compared to placental gel (11.7%). The mean duration of hospital stay was reduced in patients treated with Silnet (7.8 ± 3.2 days vs. 9.6 ± 3.8 days).

Cost-Effectiveness

When broken down into cost components, the dressing cost per patient was higher with silver dressing (Rs 950 ± 50) compared to placental gel (Rs 570 ± 90; $p < 0.001$). However, this was balanced by a substantially lower hospital stay cost in the silver group.

In summary, treatment with Silnet® silver wound dressing resulted in faster wound healing, reduced pain, fewer dressing changes, lower incidence of infection and shorter hospital stays compared to bioactive placental gel. These findings suggest that Silnet is a clinically effective and favorable option for managing clean acute and chronic wounds.

Discussion

In this prospective comparative study, Silnet® silver wound dressing demonstrated superior outcomes compared to bioactive placental gel in managing clean acute and chronic wounds. The Silnet group achieved significantly faster healing, greater wound area reduction, lower pain scores, fewer dressing changes, lower infection rates, shorter hospital stays, and lower overall treatment costs.

Our findings align with previous meta-analyses showcasing the effectiveness of silver dressings in wound management. Liang *et al*. reported that silver-based dressings significantly reduced healing time and infection rates compared to non-silver options [7]. Likewise, Jiang *et al*. concluded that silver dressings outperformed iodine dressings in accelerating healing (SMD −0.95) [8].

Economic evaluations also support our outcomes. Jemec *et al*. found that although silver dressings may have higher initial costs, they result in significant savings—approximately £141.57 per patient—due to accelerated healing and reduced need for specialist management [9]. Silnet demonstrated a similar economic advantage in our cohort via reduced hospital stay and dressing costs.

Concerning placental gel, a randomized controlled trial by Shukla *et al*. showed that topical placental extract significantly improved epithelialization rates in chronic non-healing wounds—67.5% of treated patients achieved >50% epithelialization by eight weeks compared to only 23.3% in controls [10]. Other studies suggest placental extract may reduce pain and enhance patient comfort during dressing changes, albeit to a lesser degree than observed with Silnet [11].

Silver dressings release antimicrobial silver ions, disrupting bacterial cell membranes, inhibiting biofilm formation, and attenuating inflammation—thus enhancing re-epithelialization [12]. Placental gel, conversely, is thought to promote angiogenesis and tissue regeneration via growth factors present in placental biomass [10], which may account for some healing—but less robustly than with silver.

Limitations

This study, though comprehensive, has limitations. It is single-center with a modest sample size, limiting generalizability. Despite randomization, variability in wound etiologies and patient comorbidities may have impacted results. The cost-analysis did not include societal costs such as productivity loss. Finally, only one type of silver dressing (Silnet®) was evaluated—different formulations may vary in efficacy. Larger multicentric trials with extended follow-up are needed to confirm these findings.

Silnet® appears to be both clinically effective and economically advantageous compared to placental gel, making it a compelling option for clean wound management in tertiary care settings. These results support the integration of silver dressings into standard treatment protocols to enhance healing while simultaneously reducing healthcare burden.

Conclusion

This prospective comparative study demonstrates that Silnet® silver wound dressing is more effective and cost-efficient than bioactive placental gel in the management of clean acute and chronic wounds. Patients treated with Silnet achieved faster healing, greater wound area reduction, lower pain scores, fewer dressing changes, reduced infection rates, and shorter hospital stays. While placental gel showed modest benefits in comfort and epithelialization, the overall clinical and economic advantages clearly favored silver dressings. These findings support the routine use of silver dressings, particularly Silnet, in tertiary care wound management protocols. However, larger multicenter trials are warranted to validate these results and further assess long-term outcomes.

What this study adds

- Silnet® silver wound dressing significantly accelerates wound healing compared to bioactive placental gel in clean acute and chronic wounds.
- Patients treated with Silnet experienced less pain, fewer dressing changes, lower infection rates, and shorter hospital stays.
- Despite higher initial material costs, silver dressings proved more cost-effective overall due to faster recovery and reduced hospital resource use.
- This study supports the integration of silver dressings, particularly Silnet®, into standard wound care protocols in tertiary care settings.

References

1. Li Y-X, Feng J, Liu Z-L, *et al*. Efficacy of nano-silver dressings over conventional dressings in chronic wounds: a clinical study. Indian J Surg. (Observed 91–99 % ulcer reduction in 43/50 vs 8/50, shorter hospital stays),2018:80(2):140–145. ijsurgery.com
2. Sharma A, Singh P, Verma N, *et al*. Comparative evaluation of colloidal silver vs conventional dressings in diabetic foot ulcers: healing outcomes and ulcer area reduction. Turk J Surg. (Ulcer reduction 65 % day 7, 49.34 % day 14; faster healing 23.2 vs 48.4 days),2024:40(1):23–29. turkjsurg.com
3. Lansdown ABG. Silver in wound care—friend or foe? A comprehensive review. Int Wound J. (Mixed evidence, possible cytotoxicity to keratinocytes/fibroblasts) PMC,2018:15(1):9–18.

4. Medical uses of silver. Wikipedia. (Cochrane review: mixed evidence for silver-containing dressings in venous leg ulcers) Wikipedia, 2025.
5. Moraes M, Dias RA, Pereira RS, *et al*. Placental-derived biomaterials and their application to wound healing. Bioengineering (Basel). (Placental ECM scaffold promotes cell migration, angiogenesis, and regeneration) MDPI,2023:10(7):829.
6. Velakaturi S, Ilango SP, Gunasekaran P, Nelson AA, Hema M. Comparative study of Placentrex gel dressing vs amorphous hydrogel with colloidal silver in chronic clean wounds. Int J Sci Res. (Placentrex gel achieved healing in 20 vs 30 days; fewer dressings, shorter stay),2023:12(4):60–65.
7. Liang K, Liu Y, Jiang F. Analysis of therapeutic effect of silver-based dressings on chronic wound healing: A meta-analysis. Int Wound J, 2024.
8. Jiang Y, Zhang Q, Wang H, Guo J. Effectiveness of silver and iodine dressings on wound healing: A systematic review and meta-analysis. BMJ Open,2024:14(8):e077902.
9. Jemec GBE, Kerihuel JC, Ousey K, *et al*. Cost-Effective Use of Silver Dressings for the Treatment of Hard-to-Heal Chronic Venous Leg Ulcers. PLoS ONE,2014:9(6):e100582.
10. Shukla VK, Rasheed MA, Kumar M, Gupta SK, Pandey SS. A trial to determine the role of placental extract in the treatment of chronic non-healing wounds. J Wound Care,2004:13(5):177–179.
11. Tiwary SK, Shukla D, Tripathi AK, Agrawal S, Singh MK, Shukla VK, *et al*. Effect of placental-extract gel and cream on non-healing wounds. J Wound Care,2006:15(7):325–328.
12. Shrestha S. Commercial Silver-Based Dressings: *In vitro* and Clinical Perspectives. Antibiotics (Basel),2024:13(9):910.