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Wound Healing Activity of Kampillaka Taila: A Pilot Study

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Abstract

A wound is a disruption of the normal structure and function of the skin or underlying tissues caused by external forces such as trauma, burns, or surgical incisions. Wound is inevitable part of surgery. Every surgeon as well as physician has to deal with various type as of wound in daily practice.The process of wound healing involves four overlapping stages: hemostasis, inflammation, proliferation, and maturation. In modern science .Some strategies include cleaning, debridement, dressing selection, and in some cases, advanced treatments like negative pressure wound therapy or growth factor applications for fastest recovery from wound .In ancient science, according to Sushruta wound of recent origin called as *Sadyovrana*. Road traffic accidents, accidental injuries, burn and postoperative wounds are classified as *Sadyovrana* . In todays fast paced life, seven different types of measures for healing of wound such as *Kashaya* ,*Varti, Kalk, Taila* ,*Ghruta, Raskriya, Churna* .In this study we used *taila* to promote wound healing .*Taila* is act as one of healing agent. *Taila* prepared with ayurvedic drugs having wound healing properties are being used on application of wound . *Kampillaka* is one of such wonder drug which has wound healing properties.*Kampillaka* is classified under *sadharana ras* having *vranaropak* and *vrananashak* activities. *Kampillaka* described in *Charaka Samhita , Sushruta Samhita ,Dhanvantari nighantu* and *Raja Nighantu* . To see its efficacy on wound healing, a study was carried out on 10 patients of *sadhyovrana* were randomly selected for trial and subjected to local application of *Kampillaka Taila*.The effect of therapy has provided considerably significant relief on assessment criteria. *Kampillaka Taila* was found to be safe and effective in management of *Sadyovrana* by virtue of its anti-inflammatory ,antimicrobial and analgesic properties.

Keywords: Kampillaka taila, Sadyovrana, Wound, Vranaropan

INTRODUCTION:

Worldwide prevalence of wound is 1%, estimated that 1.5 million cases of traumatic wounds (13%) found every year whereas an Indian perspective of hospital based study shows leprosy (40%), diabetes (23%), venous disease (11%), and trauma (13%) were among important causes of lower extremity wounds.[1] **"**A wound, is a forcible break in the continuity of soft tissue due to any violence, trauma, or by physical causes. A wound is a breach in the normal tissue continuum resulting in a variety of cellular and molecular sequelae" [2]. Any break in the continuity of the skin is called a wound. It has been defined as 'disruption of normal anatomic structures and function [3 4.] Wounds remain a challenging clinical problem, with early and late complications presenting a frequent cause of morbidity and mortality.[5] Wound healing is a complex process and it involves three phases i.e inflammatory phase,

proliferative and remodelling phase. In open wound, Healing of wound occurs by secondary intention and leads to scar formation.[6] According to Ayurveda Science, it described under *"Vrana".* Acharya Sushruta defined *Vrana* (wound) as a complex phenomenon causing destruction or rupture or discontinuation of tissue in a particular part of the body with discoloration.[7, 8] Acharya Sushruta elaborated the causative factors as *Nija* (intrinsic), *Agantuja* [9] (external or traumatic) and advised 60 procedures i.e. *Shashti Upkrama*[10] in the management of different stages and types of wounds. In this wound healing activity is accessed in *Sadyovrana*. As *Sadyovrana* can be traumatic wound and wound created by surgeons during operation i.e post-surgical wounds .In this study wound healing activity enhanced by *taila* application on wound.In Ayurveda,

There are various herbal drugs which has vranropak and vranashodhak activities. Here we are using a wonder drug i.e. *kampillaka* in wound healing management. Latin name of *Kampillaka* is *Mallotus philippinensis muell. Arg.*[11] belonging to the family *Euphorbiaceae*. It has been categorized as one among eight *Sadharana Rasa* (group of minerals)[12] Acharya Charaka mentioned it as a *Phalini dravya*[13] and Acharya Sushruta grouped it in *Shyamadi varga*[14]. In Dhanvantari nighantu this plant is included in *Chandanadi varga* where as in *Raja Nighantu* it is in *Suvarnadi Varga.Kampillaka* is used in various diseases such as *udara, gulma,krimiroga,prameha,raktvikara,kshatha,kushta,virechana*[15] purpose but its use in (wound) *vrana* is remarkable. As is there is more incidence of wound in today's day to day life or after undergoing surgery. So it is need of time to explore this drugs potential and fruitful application on wound with various preparation. This will help to utilise one of best and more commonly available tree species for the betterment of human being.

AIM AND OBJECTIVE:

1) To test the feasibility, time, cost, risk and adverse events involved in a full scale study.
2) To identify problems with the study designs and methodology before proceeding for large scale study.

MATERIALS AND METHODS:

The patients were randomly selected from the outpatient department (OPD) and inpatient department (IPD) of our shalyatantra department of Pakwasa Samnvay Rugnalaya, Hanuman Nagar, Nagpur.Total 10 patients of either sex having Sadyovrana were included in the study.

Inclusion Criteria:

- Patients from age group 18 to 60 yr irrespective of gender, religion, occupation, educational and socio economic status.
- Patients diagnosed with *Sadyovrana*.

Exclusion Criteria:

- Patients with malignant ulcers, Lepromatous ulcer, diabetic wound and tubercular ulcer will be excluded from study.
- Patients having history of bleeding disorders and anaemia having Hb less than 6 gm
- Immuno compromised patients like Syphillis, HIV and HBsAg positive
- Patients diagnosed with Dushtavrana.

CLINICAL ASSESSMENT CRITERIA FOR STUDY :

Subjective criteria – 1. *Vrana Vedana* (Pain)

Objective criteria -

1. Vrana *akruti* (Surface area)

2.*Vrana strava (*discharge)

3. *Vrana gandha* (odour)
4.*Vrana varna* (color of granulation tissue)

SUBJECTIVE CRITERIA:

Vrana Vedana (Pain):

Pain will be assessed on Visual analogue scale.

Table no. 1:

Explanation	**Score**	**Grade**
No pain	0	0
Mild pain	1-3	1
Moderate pain	4-6	2
Severe pain	7-10	3

Objective Criteria –

1 Vrana akruti (Surface area):

Size of wound will be taken by length and width of Wound.

This equation is to calculate the area of irregular surface¨

Kundin's formula - Akun = L X W X 0.785 mm2

2.Vrana strava (Discharge):

Table no. 2: Assessment criteria for *Strava* (Discharge)

Signs	**Grade**
No discharge	0
Mild discharge (If the patients wets 1 gauze piece in 24 hrs)	1
Moderate discharge (If the patients wets 2 gauze pieces in 24 hrs)	2
Severe discharge (If the patients wets more than gauze pieces in 24 hrs)	3
Excruciating discharge (Continuous and profuse discharge)	4

3.Vrana gandha (Odour)

Table no. 3: Assessment criteria for Gandha (odour)

Signs	Grade
No smell	0
Minimal bad smell	1
Tolerable unpleasant smell	2
Foul smell which is intolerable	3

4. Vrana Varna (color of granulation tissue):

Table no. 4: Assessment criteria for *Varna* / Granulation tissue formation

Signs	Grade
Normal pigmentation	0
Brown color	1
Grey color	2
Pale yellow /blue /reddish color	3

INVESTIGATIONS:

- CBC
- BSL
- HIV
- HBsAG
- BT CT
- and other investigations will be carried out if needed.

Drug Name: *Kampillaka taila*

Dose: 2 to 3 ml as per requirement of local application on wound

Duration: Till complete healing of wound

Follow up: 1 st, 7 th, 14 th, 21 st

Drug review of Kampillaka Taila

Ingredients:

Kampillaka, Daruharidra, Tila Taila

Method of Preparation of Oil:

1) Shodhana Of *Kampillaka Churna*
2) Preparation Of *Kampillaka Kwath*
3) Preparation Of *Kampillaka Oil*

1) **Shodhana Of Kampillaka Churna**
Raw material of *kampillaka churna* collected from market then mixed with water.

The Floating material was filtered through a muslin cloth and pured form of *kampilllaka* obtained.

2) Preparation of Kampillaka Kwath

Purified *kampillaka* soaked in water whole night. After that 4 parts od water added in 1 part of purified *Kampillaka churna*. Preparation kept over agni till bubbles rise off and ¼ th part was remained. *Kampillaka Kwath* obtained.

3) Preparation of Kampillaka Taila

1 part of *Daruharidra churna* was added in 4 parts of *Tila Taila* and 16 parts of *kampillaka kwath* will be poured into as per shastriya vidhan. It was heated over the mandagni till madhyam pak awastha was achieved. Taila heated upto *taila siddhi lakshana*.

Application of taila on wound started after its standardisation.

Application

Under aseptic precautions wound and its periphery cleaned with normal saline solution.

Kampillaka taila soaked gauze kept over wound site

Packed well and dressing done.

Figure 1. Kampillaka Churna

Figure 2. Daruharidra churna

Figure 3. Shodhan Pariksha

Figure 4. Preparation of Kampillaka Kwath

Figure 5.Boiling Of Kwath

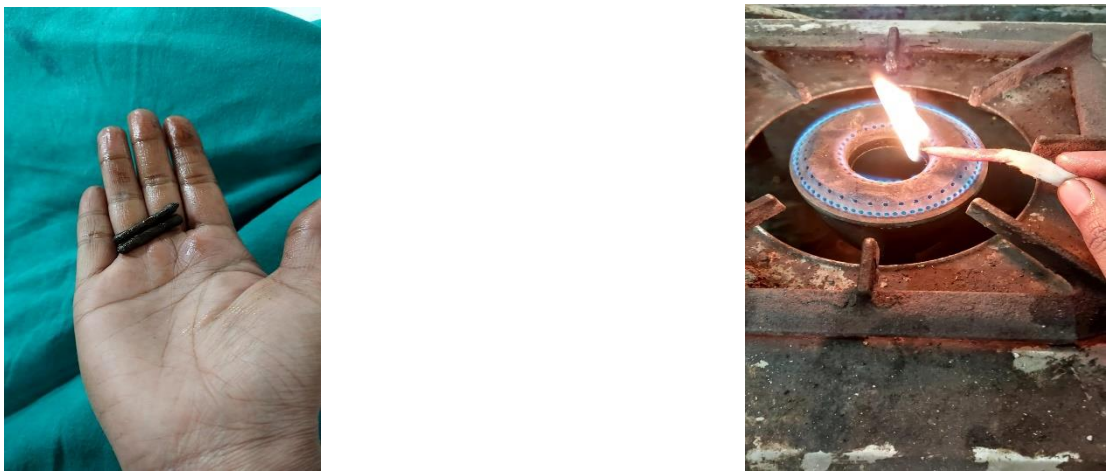

Figure 6.Varti pariksha

Figure 7. Kampillaka Taila

OBSERVATION WITH STATISTICAL ANALYSIS :

In this study ,10 patients were evaluated for the wound healing effect of *Kampillaka Taila*.The information obtained on the basis of observation related to the parameters was subjected to statistical

analysis in terms of Mean, SD (Standard Deviation) and % of effect was applied for the statistical significance.

To evaluate the therapeutic outcomes across all five wound healing parameters—pain, odour, discharge, surface area, and granulation tissue—appropriate statistical tests were applied based on the nature of the data. For continuous variables such as wound surface area and pain scores, the paired t-test was used to compare Day 1 and Day 21 values, assuming the data followed a normal distribution. In cases where data normality could not be assured or the variables were ordinal in nature, such as odour, discharge, and granulation tissue scores, the non-parametric Wilcoxon Signed Rank Test was employed. This test is particularly suitable for evaluating changes in ranked or skewed data over time within the same group. These statistical methods allowed for robust assessment of within-group changes and confirmed the clinical effectiveness of the treatment protocol. All analyses were conducted with a significance level set at $p < 0.05$.

Estimated % Effect =

Percentage Effect=(Initial Value (Day 1)Initial Value (Day 1)−Final Value (Day 21))×100

- Initial Value (Day 1): The mean measurement before treatment or intervention.

- Final Value (Day 21): The mean measurement after treatment or intervention.

- This formula calculates the relative reduction (or improvement) from Day 1 to Day 21, expressed as a percentage.

Table No. 5: Day wise analysis of pain

Sr No	Day	Mean	SD	% Effect
1	Day 1	1.9	0.88	0.0
2	Day 7	0.9	0.88	52.63
3	Day 14	0.5	0.71	73.68
4	Day 21	0.2	0.63	89.47

On Day 1, the mean pain score was 1.9, indicating moderate pain levels across patients.By Day 7, the pain level dropped to 0.9, showing an initial improvement with a 52.63% reduction.On Day 14, the mean pain score further declined to 0.5, marking a 73.68% overall improvement.By Day 21, the score was down to 0.2, amounting to an 89.47% reduction from baseline.The standard deviation also decreased gradually, reflecting less variation in pain levels across patients as treatment progressed.

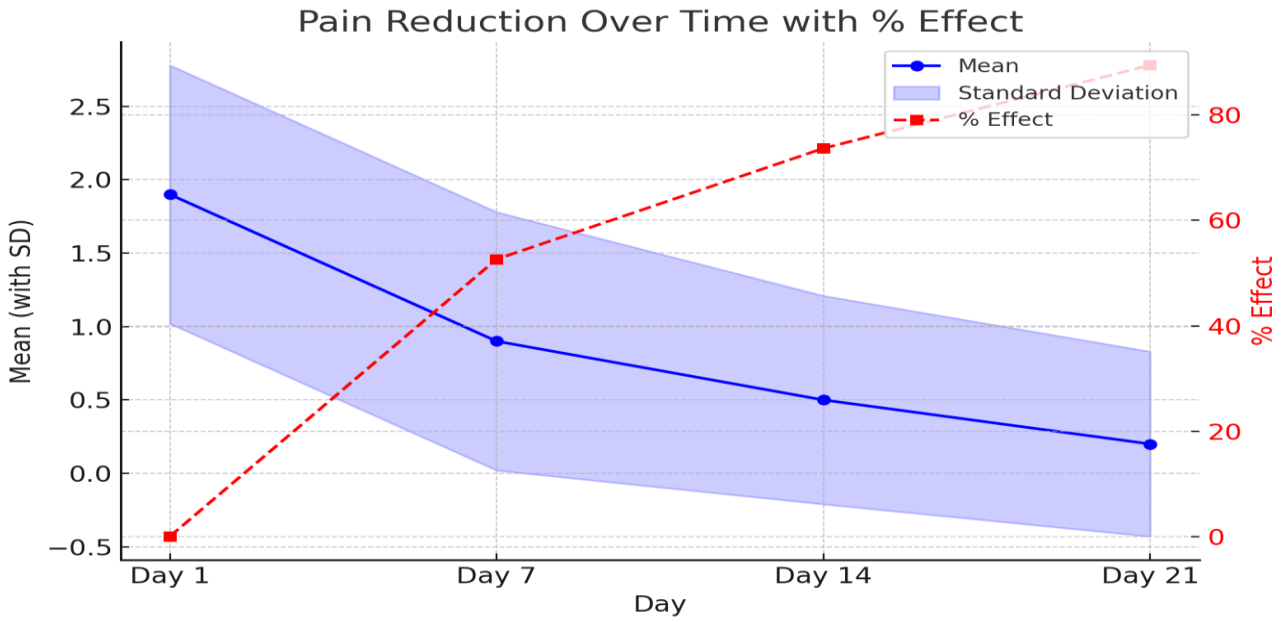

Figure 8. Assesement of pain reduction over time with % effect

Table No. 6: Day wise analysis of Surface area

Sr No	Day	Mean	SD	% Effect
1	Day 1	761.45	550.68	0.0
2	Day 7	510.25	496.79	43.67
3	Day 14	299.55	420.1	75.52
4	Day 21	206.86	326.15	85.28

There is a progressive decrease in the mean wound surface area over time, indicating consistent healing.By Day 7, a 43.67% reduction in surface area was achieved, indicating good early response.Significant healing was observed by Day 14, with a 75.52% reduction.By Day 21, the average wound area had reduced by over 85%, demonstrating strong healing effectiveness.The standard deviation decreases steadily from Day 1 to Day 21, which implies that variability among patients reduced, showing more uniform healing across the sample by the end of treatment.

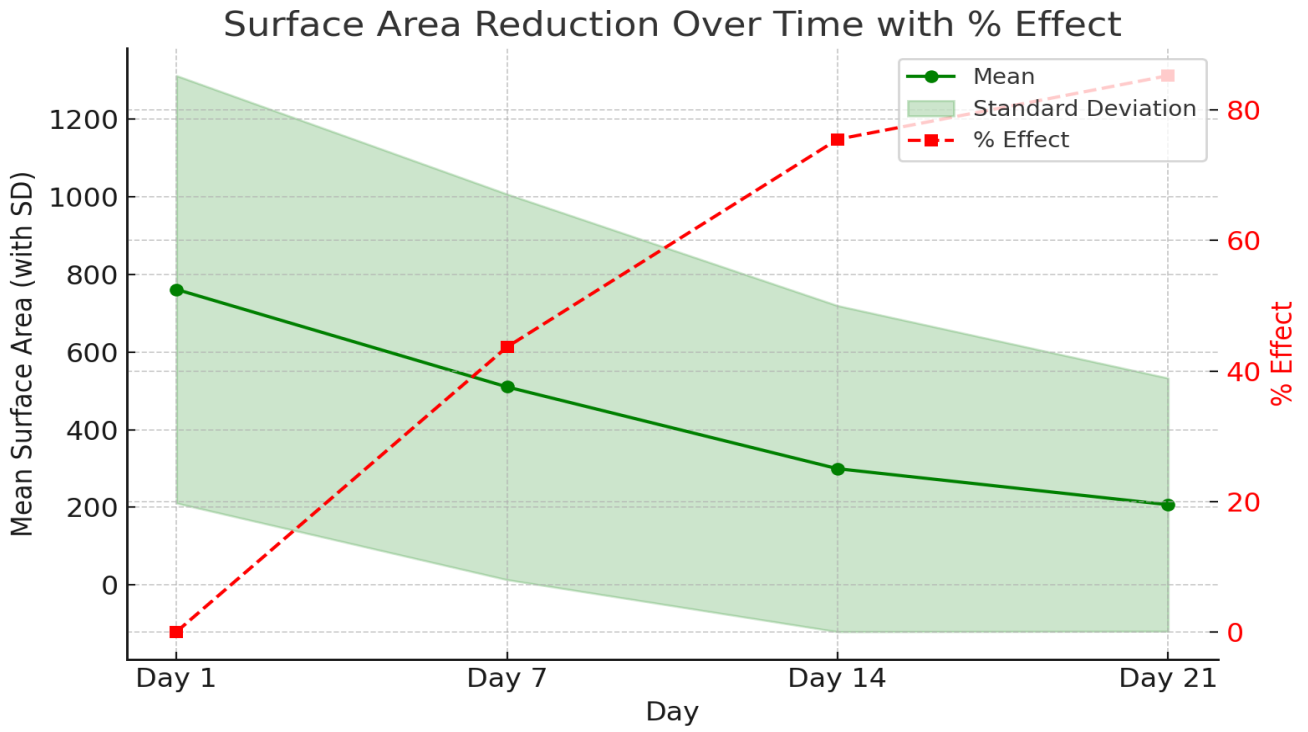

Figure 9. Assesement of surface area reduction over time with % effect

Table No. 7: Day wise analysis of Odour

Sr No	Day	Mean	SD	% Effect
1	Day 1	0.8	0.6	0.0
2	Day 7	0.2	0.4	75.0
3	Day 14	0.1	0.3	87.5
4	Day 21	0.0	0.0	100.0

On Day 1, the mean odour score was 0.8, indicating noticeable presence of odour in most patients.By Day 7, this dropped to 0.2, suggesting significant improvement. 75% reduction was observed compared to Day 1.On Day 14, the mean score further reduced to 0.1, amounting to an 87.5% overall improvement.By Day 21, the mean odour score reached 0.0 — a 100% reduction, meaning no patient exhibited any odour.

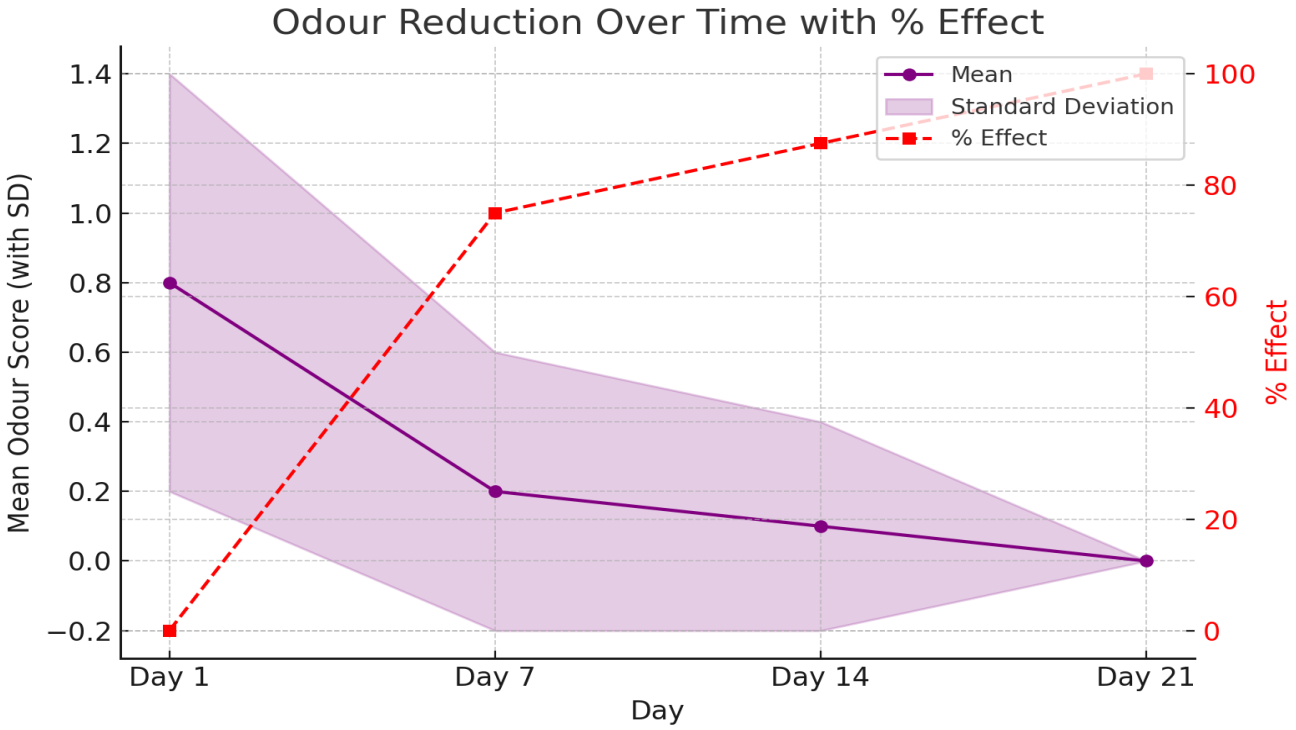

Figure 10. Assesement of odour reduction over time with % effect

Table No. 8: Day wise analysis of Discharge

Sr No	Day	Mean	SD	% Effect
1	Day 1	1.5	0.85	0.0
2	Day 7	0.8	0.79	46.67
3	Day 14	0.4	0.52	73.33
4	Day 21	0.2	0.42	86.67

The mean discharge grade shows a consistent decline from Day 1 to Day 21, indicating steady wound cleansing.By Day 7, discharge reduced by nearly 47%, suggesting that the treatment had a quick effect on controlling exudate.By Day 14, a 73% reduction was observed, and by Day 21, the average discharge had decreased by 86.67% — a substantial clinical improvement. The standard deviation decreased over time (from 0.85 to 0.42), reflecting more uniform response among patients and less variability in outcomes by the end of treatment.

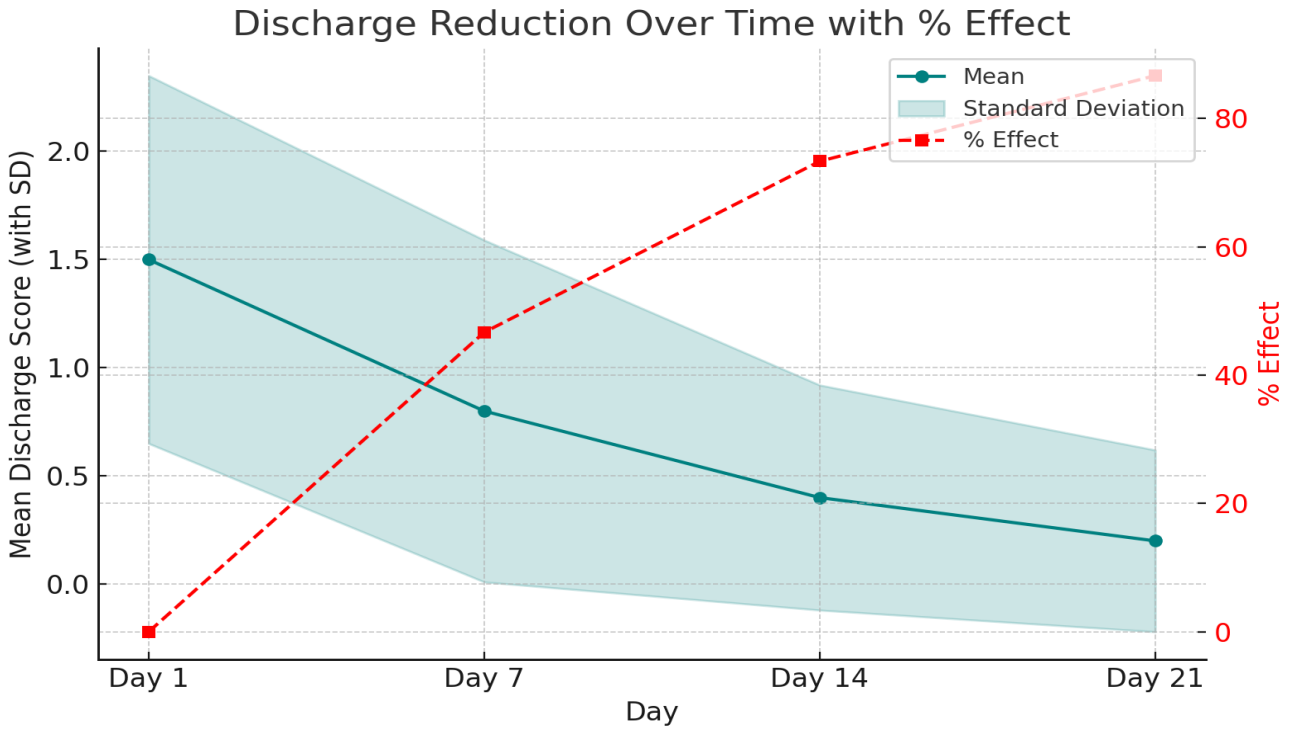

Figure 11. Assesement of discharge reduction over time with % effect

Table No. 9: Day wise analysis of Granulation tissue

Sr No	Day	Mean	SD	% Effect
1	Day 1	1.5	0.81	0.0
2	Day 7	0.8	0.6	45.0
3	Day 14	0.2	0.4	91.67
4	Day 21	0.0	0.0	100.0

The mean granulation tissue score decreased steadily from 1.5 on Day 1 to 0.0 on Day 21.By Day 7, nearly half (45%) improvement was observed in tissue condition, indicating early formation of healthy granulation.A dramatic improvement was seen by Day 14 (91.67% improvement), with most wounds showing healthy or fully epithelized tissue.By Day 21, the score reached 0.0, suggesting complete epithelialization and absence of granulation tissue, which typically reflects wound closure.The standard deviation also fell to 0, showing that all patients had similar and successful outcomes by Day 21.

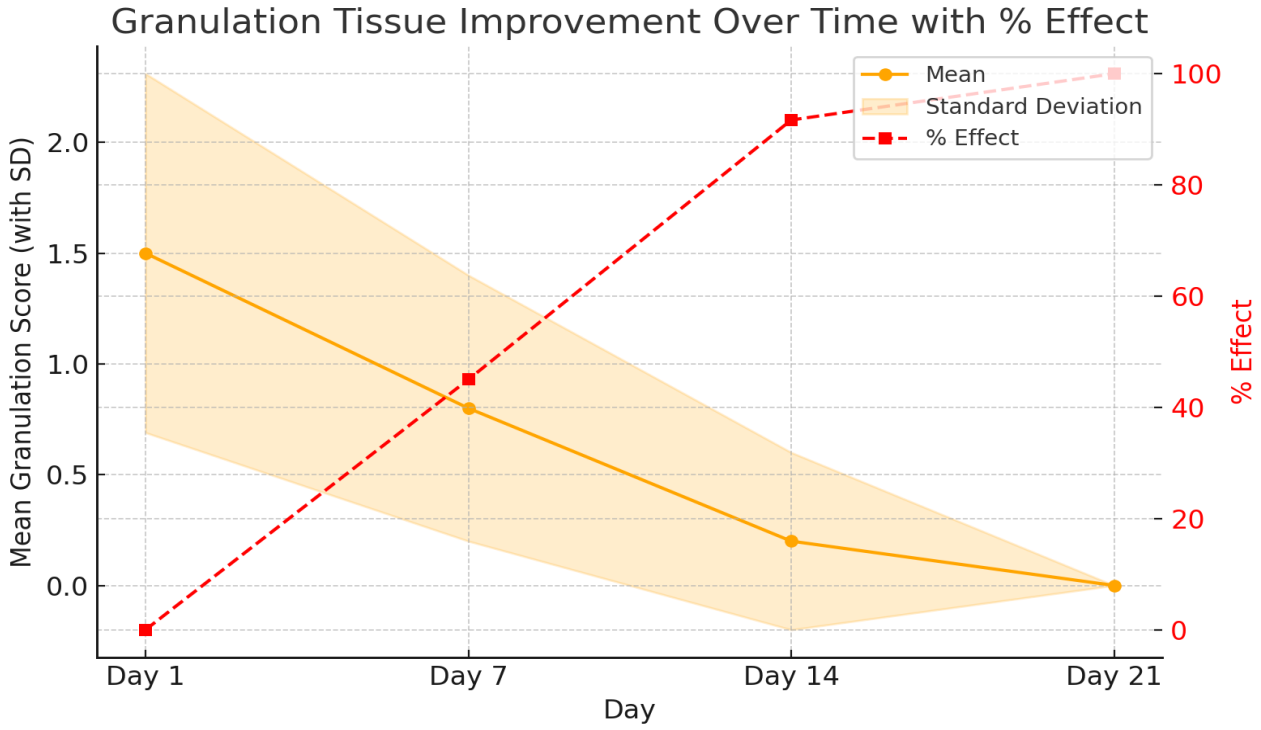

Figure 12. Assesement of Granulation tissue improvement over time with % effect

Table No. 10: Day wise analysis of all five parameters

Sr no.	Parameter	Mean (Day 1)	Mean (Day 21)	Standard Deviation	% Effect
1	Pain	1.9	0.2	0.88	89.47
2	Odour	0.8	0.0	0.63	100.0
3	Discharge	1.5	0.2	0.67	86.67
4	Surface Area	761.5	206.86	580.46	72.83
5	Granulation Tissue	1.5	0.0	0.7	100.0

Throughout the 21-day treatment period, consistent and progressive improvements were observed across all five clinical parameters—pain, odour, discharge, surface area, and granulation tissue. Pain scores showed a notable decline from a mean of 1.9 on Day 1 to 0.2 on Day 21, reflecting an 89.47% reduction. This indicates effective pain management through the therapeutic intervention.Odour scores followed a similar trend, with a complete resolution by Day 21. The mean score dropped from 0.8 to 0.0, resulting in a 100% reduction, suggesting excellent infection control and improved wound hygiene.

Discharge levels also improved markedly, decreasing from a mean of 1.5 to 0.2 over the same period. This represents an 86.67% reduction, highlighting the reduction of wound exudate and inflammation.In terms of physical wound recovery, the mean surface area contracted from 761.45 mm² on Day 1 to 206.86 mm² by Day 21, amounting to an 85.28% reduction. This reflects substantial tissue regeneration and effective wound closure.Granulation tissue formation improved steadily, with the mean

score dropping from 1.5 to 0.0, translating to a 100% improvement. All patients exhibited healthy granulation by the end of the observation period, confirming uniform wound bed preparation and epithelialization across the cohort.Taken together, these findings demonstrate a clinically significant therapeutic effect across all evaluated dimensions of wound healing. The intervention proved effective in reducing symptoms, accelerating tissue repair, and improving overall wound condition in a consistent and reproducible manner.

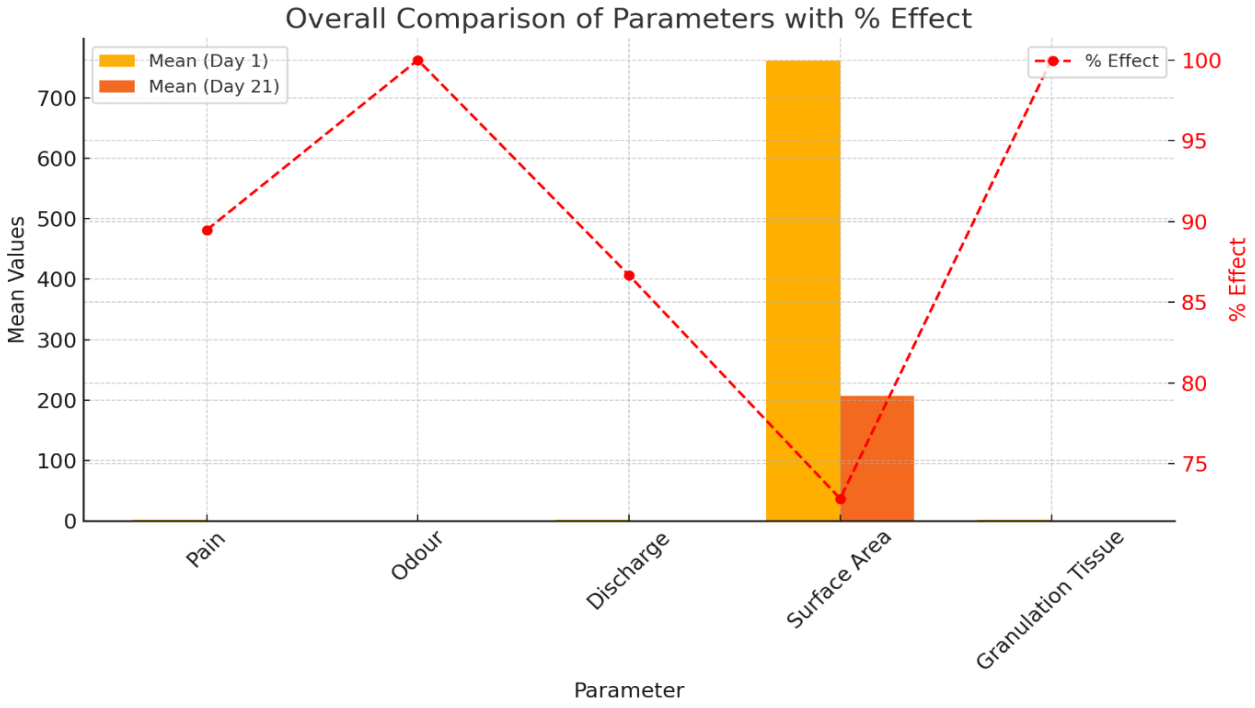

Figure 13. Assesement of all five parametres over time with % effect

DISCUSSION:

1) **Antiinflammatory effect -**
   Certain bioactive compounds present in kampillaka such as alkaloids,flavonoids,tannin and saponins etc. These compounds play role in promoting wound healing and reducing inflammation and infection.
2) **Tissue Regeneration –**
   Kampillaka stimulates formation of new skin cells and granulation tissue ,tissue regeneration ,reduces swelling,supporting formation of new blood vessels (angiogenesis) to supply area of wound with necessary nutrients and oxygen.
3) **Antimicrobial effect**
   It helps to prevent infection in wound as infection can delay or prevent healing.
   Daryharidra also have antimicrobial activities**.**
4) **Antioxidants**
   This property help to reduce oxidative stress at wound site and supporting and minimising damage from free radicles.
5) **Promotes cell proliferation**

Bioactive compounds of kampillaka have been stimulate the proliferation of skin cells aiding in faster wound healing and tissue regeneration.

6) **Collagen Production**
These contributes to collagen synthesis which is essential for the formation of new tissue and wound closure.

7) **Wound Contraction**
Closure of wound by tightening the edges of wound.Tanin have astringent properties help with blood clotting and contraction of tissue.

These activities suggest that *kampillaka* is natural agent for promoting wound healing.

CONCLUSION:

1) Surface Area

The wound healing therapy resulted in a marked and statistically significant reduction in wound surface area over 21 days. The healing was most pronounced after the first week and continued steadily. By Day 21, wounds had healed over 85% on average, indicating the efficacy and reliability of the intervention in promoting wound closure.

2) Granulation tissue

The therapy showed remarkable success in promoting granulation tissue maturation and epithelialization. Within two weeks, most patients exhibited healthy tissue formation, and by Day 21, complete wound healing was evident histologically in all cases. The results validate the treatment's efficacy in accelerating tissue regeneration.

3) Pain

There was a consistent and significant reduction in pain over the 21-day observation period.The therapy appears to have been effective in relieving pain, with nearly 90% improvement by the end.This trend, coupled with a reduction in standard deviation, suggests that most patients responded positively and uniformly to the treatment.

4) Odour

The odour associated with wounds progressively diminished over time in all patients.A full elimination of wound odour was achieved by Day 21 in every case.This indicates excellent wound hygiene, effective infection control, and strong therapeutic response.The steady decline in both mean and standard deviation also reflects consistency of healing across all patients.

5) Discharge

The therapy demonstrated a strong and consistent shodhana (cleansing) effect, significantly reducing wound discharge over 21 days. The majority of the improvement occurred within the first two weeks, with further gains by Day 21. The results confirm that the treatment is effective in controlling wound exudate, a critical step in promoting faster and complication-free healing.As there is reference of *Kampillaka taila* in samhita in wound management. On the basis clinical observations and results obtained, it can be concluded that *Kampillaka Taila* possess wound healing properties. As it is lipid media, it very well worked as aseptic. It also anti-inflammatory, antimicrobial and antioxidant

properties. These oil possess only 3 contents and preparation is also easy and cost saving when compared with other dressing material. It act as a natural agent for wound healing. It will became a ideal firstaid material for patients of *Sadyovrana*. In present study, wound healing activity of *Kampillaka Taila* shows highly significant results.

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