

A Comparative Study of Split Thickness Skin Graft (STSG) With *Jalaukavacharana* and without *Jalaukavacharana* in the Management of *Dushta Vrana* (Chronic Non- Healing Ulcer)

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ABSTRACT

Background: Ulcer is the break in the continuity of covering epithelium either skin or mucous membrane. In *Ayurveda* it is described as *Vrana*. *Jalaukavacharna* is type of *Raktamokashana*. Split thickness skin Grafting is the type of skin grafting.

Aims and Objectives: To Assess and compare the effect of *Jalaukavacharna* in acceptance of STSG in both groups with changes obtained in Pre decided criteria.

Material and Method: It was randomized, open labeled clinical study. Total enrolled 30 patients were equally divided in two groups. In Group A pre treatment of *Jalaukavacharna* done for 5 days and then STSG procedure done. In Group B only STSG done.

Observation and Results: Signed rank test suggest that there is highly significant difference in Adherence of STSG, Discharge and Color ($p < 0.001$), But no significant difference in Graft edema ($p = 1.00$) and Foul smell ($p = 0.5$) in Group A. There is highly significant difference in Adherence of STSG, Discharge and Color ($p < 0.001$), But no significant difference in Graft edema ($p = 0.5$) and Foul smell ($p = 0.5$) in Group B. Mann Whitney U test suggest that there is no significance difference between two groups.

Discussion: Pre-treatment of *Jalaukavacharana* before STSG is not more effective in acceptance of STSG than only STSG without pre-treatment of *Jalaukavacharana* in the surgical management of *Dushtavrana*.

Conclusion: Split Thickness Skin Graft with *Jalaukavacharna* is not beneficial statically.

KEY WORDS: *Dushtavrana*, *Jalaukavacharna*, Leech Therapy, Skin Grafting, Ulcer

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Aims and Objectives:

- To Assess and compare the effect of *Jalaukavacharna* in acceptance of STSG.
- To Understand the Effect of *Jalaukavacharana* in *Dushtavrana* (Chronic non healing ulcer).
- To Evaluate the Acceptance or Rejection of STSG After *Jalaukavacharna*.
- To Evaluate the Acceptance or Rejection of STSG Without *Jalaukavacharna*.

INTRODUCTION

“Ulcer is the break in the continuity of covering epithelium either skin or mucous membrane due to molecular death.”^[1]It is estimated that 1 to 2 percent of the population in the

developed countries will suffer from a chronic wound. The impact of chronic wounds is on the health and quality of life of the patients and their families should not be underestimated. Chronic non healing wounds are wounds that have the failed to progress through a timely sequence of repair, or one that proceeds through the wound healing process without restoring anatomical and functional results. Typically, a range of 4 weeks to 3 months has been used to define chronic wounds in the literature.^[2]

Split thickness skin grafts is the procedure in which epidermis and part of dermis included in harvesting.

In *Ayurveda*, ulcer described as title of *Vrana*. Most details explanation of ulcer was given by *Acharya Sushruta* in *Sushruta Samhita*. Sixty remedial measures are designated for management of pathological wounds. *Acharya Sushruta*

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described non healing ulcer under title of *Dushtavrana* (Non healing ulcer). He gave detailed description of *Dushta Vrana* in *chikitsasthana*.^[3] Acharya Sushruta mentioned *Raktamokshana* as one among the five purification procedures of *Ayurveda*. *Raktamokshana* is that procedure which expels out vitiated blood from body. He described *Prachchhan*, *Siravedha*, *Jalauka*, *Shringa* and *Alabu* for the *Raktamokshana*.^[4]Leech therapy (*Jalaukavacharana*) is considered as one of the easy and convenient blood letting therapy. There are two types of *Jalauka* mentioned: *Savisha*-poisonous (6 types) and *Nirvisha*- non poisonous (6 types).^[5] Acharya sushruta known as the ‘Father of plastic surgery’. Modern plastic and reconstructive surgery has been passed through many milestones, but earliest evidence of plastic surgery was found in *Sushruta Samhita*. Acharya Sushruta mentioned many techniques such as *Rhinoplasty*, *Nasoplasty*, and *Lobuloplasty* etc.^[6]

Medicinal leeches have been used in the past 50 years for the salvage of tissue with venous congestion. In 1960, Deganc and Zdravic^[8] conducted the first treatment of congested flaps using leeches. Today, especially in the field of reconstructive microsurgery, medicinal leech therapy is enjoying a renaissance^[9,10] In July 2004, the FDA approved leeches as a medical device in the field of plastic and reconstructive surgery. A survey of all 62 plastic surgery units in the United Kingdom and the Republic of Ireland showed that the majority of these units uses leeches postoperatively [12]. Before this study Leeches are generally used during the critical postoperative period when venous outflow cannot match the arterial inflow, which can lead to venous congestion, clinically identified by the dusky purple appearance of the skin.^[11]

The leech produces a number of important substances which contribute to the special property of the bite, including an anticoagulant, a local vasodilator and local anesthetic. Like Hirudin, Hyaluronidase, Hementin etc. They secrete anticoagulants to prevent blood clots and relieve pressure due to pooling blood Leech saliva helps to re-establish bloodflow means of a vasodilator. Deprive blood clots and decreased chances of venous stasis. Increased fresh and oxygenated blood to the ulcer area increased viable tissue to the ulcer. Decrease infection and dead tissue.^[7] After placing the graft in recipient area, it established the connection with recipient bed by 3 stages: Plasmic Imbibition, Inosculation and Neovascularization. After the combined effect of leech saliva,

it facilitates the acceptance of graft. Thus this novel study will be beneficial for future plastic and reconstructive surgery.^[6]

MATERIAL AND METHODS

Selection of patients: Patients were selected by random sampling method from O.P.D. and I.P.D. of Institutional Hospital,.

Study design and Sample size: Randomized, interventional clinical study of 30 patients. This contains 15 participants in each group.

Ethics committee clearance and consent: As this was a clinical research, Institutional Ethical Committee approval was taken Prior to initiation of research work its is approval no. 98.

Inclusion criteria

- I. Age 10-70 years
- II. Patient with ulcer size less than 7×7 cm of each ulcer
- III. Patients are selected irrespective of caste and religion.

Exclusion Criteria

- I. Patients with infectious diseases like AIDS, HbsAg, HCV etc.
- II. Patient with ulcer size more than 7×7 cm of each ulcer
- III. Age above 70 & below 10 years.
- IV. Patients with coagulopathy (like Haemophilia)
- V. Vulnerable group of people like mentally ill.
- VI. Uncontrolled DM (HbA1c level above 50 mmol/mol (> 6.5%)
- VII. Blood pressure >150/90, Malignant hypertension, Accelerated hypertension

Investigations

Complete Blood Count, Hepatitis C Virus, , Hemoglobin A1c, Erythrocyte sedimentation rate, Urine analysis (Physical, Chemical, Microscopic), HIV, HbsAg, BT & CT, RBS, LFT, RFT, Arterial & Venous Doppler (if necessary)

Treatment Plan

The selected 30 patients were divided into two equal groups – Group A & Group B

Group A (with *Jalaukavacharana*): Procedure of Debridement on day 1, *Jalaukavacharana* for 5 continuous days (Day 2-6) & then STSGs was carried out on 7th.

Group B (without *Jalaukavacharana*): Procedure of Debridement and STSGs was carried out on same day.

Criteria of Assessment:

Acceptances of STSG were determined according to subjective criteria given below:

No.	Criteria name	Day 4	Day 7	Day 10	Day 60
1.	Adherence of STSG				
2.	Discharge				
3.	Graft Oedema				
4.	Foul smell				
5.	Color				

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No.	Criteria name	Gradation
1.	Adherence of STSG	Grade-0 Fully Adhere Grade-1 Half Adhere Grade-2 Partially Adhere (< Half) Grade-3 No Adhere
2.	Discharge	Grade-0 No Discharge Grade-1 Serous Discharge Grade-2 Serosanguinous Grade-3 Pus Discharge
3.	Graft Oedema	Grade-0 No Grade-1 Yes
4.	Foul Smell	Grade-0 No Grade-1 Yes
5.	Colour*	Grade-0 same as normal skin color Grade-1 +1 then normal skin color Grade-2 +2 then normal skin color Grade-3 +3 then normal skin color Grade-4 +4 then normal skin color Grade-5 >+4 then normal skin color

*color grade will be decided with von luschan chromatic scale.

Statistical Analysis of Data

Assessment of the therapy was done by preparing clinical proforma. The obtained data were analysed statistically with Signed Rank Test and Mann Whitney U Test.

Observations

30 patients were enrolled and all the patients completed the study procedure. The patient from Group A and 3 patients from Group B left treatment. Maximum number of patients (43.33%) belonged to the age group of 51-70 years. Maximum number of patient (93.33%) is Male. Maximum patients were Hindu (56.67%) and Muslim was 43.33%. Maximum numbers of patients (90%) had normal sleep and 10% had disturb sleep. 50 % were vegetarian and 50 % patients had mixed diet. maximum patients i.e. 63.33% were having good appetite. Maximum numbers of patients have i.e. 80% regular bowel habit. 13.33% patients are smokers, 13.33% are alcoholic and 16.67% have habit of tobacco chewing. Signs and symptoms of *Dushtavrana* are discontinuity of skin or mucus membrane, pain, swelling, burning, discharge, discoloration of skin, eczema etc. According to cause total 23.33% of all patients have traumatic ulcer, 0% have arterial, 20% have venous, 10% pressure/decubitus, 13.33% have diabetic, 23.33% cellulities, 0% tuberculous, 13.33% have burns as cause. According to nature total 23.33% of all patients have spreading ulcer, 0% have healing , 40% have non healing, 36.67% have callous ulcer in nature.

RESULTS

In Group A, There is highly significant difference in Adherence of STSG, Discharge and Color (p<0.001). But

there is no significant difference in Graft edema (p =1.00) and Foul smell (p=0.5).

In Group B, There is highly significant difference in Adherence of STSG, Discharge and Color (p<0.001). But there is no significant difference in Graft edema (p =0.5) and Foul smell (p=0.5).

Comparative effect in both groups is 76.92 % and 37.5% alternatively in Group A and Group B in Adherence of STSG. (p=0.341), 70.59 % and 6.25% alternatively in Group A and Group B in Discharge. (p=0.092), 0 % and 50% alternatively in Group A and Group B in Graft edema. (p=0.316), 0% and 0% alternatively in Group A and Group B in Foul smell. (p=1), 66.15 % and 39.62% alternatively in Group A and Group B in Color. (P=0.212)

DISCUSSION

Discussion on disease reveals that Ulcer is the break in the continuity of covering epithelium either skin or mucous membrane due to molecular death^[1]. It can be consider as chronic when it can not heal after 4 weeks of time period. *Acharya Sushruta* mentioned it as a *Dushtavrana*.^[3] Split thickness skin grafting is the procedure in which epidemis and part of dermis harvested from one donor area and placed on ulcer. *Jalaukavacharna* before STSG can increase the survival of STSG. *Acharya Sushruta* is the person who gives description of *Sandhankarma* first time in history. Saliva of the leech contains many chemicals. Combined effect of all facilitate the acceptance of STSG. But According to study there is no significant difference in both groups on base of decided criteria i.e Adherence of STSG, Discharge, Graft edema, Color, Foul smell.

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The saliva of leech contains many bio chemicals which has broad range effects. The saliva of *H. medicinalis* contains more than 100 bioactive substances, including coagulation inhibitors, platelet aggregation inhibitors, vasodilators, and anaesthetizing, antimicrobial and anti-inflammatory^[13,14] agents

One of the most important ingredients is hirudin, which is the principal anticoagulant responsible for enhanced bleeding and prevention of coagulation. In addition to hirudin, leeches secrete two inhibitors of Factor Xa responsible for the conversion of prothrombin to thrombin^[15]. Furthermore, leech saliva is an effective platelet aggregation inhibitor due to the presence of active ingredients such as calin, apyrase, platelet activating factor (PAF-) antagonist, collagenase, and prostaglandin. Their main function is preventing the ingested blood from coagulating within the leech's gut. The medical benefit to the patient is a sustained local bleeding that can last several hours after the end of each leech session.

The saliva of the medicinal leech also contains proteinase inhibitors, such as bdellins^[16], eglin, inhibitors of α -chymotrypsin, subtilisin, and the granulocytic neutral proteases-elastase and cathepsin G^[17, 18], responsible for the anti-inflammatory effect of leeching.

Medicinal leeches also secrete hirustasin, which selectively inhibits tissue kallikreins that are largely responsible for the maintenance of a normal level of blood pressure. Hirustasin can also play a role in the intrinsic coagulation process^[19].

The anti-inflammatory and analgesic properties of leeches are subjects of modern hirudobiochemistry and hirudopharmacology and in many aspects are associated with the blockage of amidolytic and kininogenase activities of plasma kallikrein, resulting in prevention of pain or pain relief during leech sessions^[20].

Leeches may also secrete a vasodilative, histamine-like substance, which increases the inflow of blood after a leech bite and reduces local swelling^[15].

Hyaluronidase, which is known as the "spreading factor," can degrade tissue hyaluronic acid, thus facilitating the infiltration and diffusion of the remaining ingredients of leech saliva into the congested tissue. Tissue permeability, restored with the help of hyaluronidase, promotes the elimination of tissue- and circulatory-hypoxia as well as local swelling^[21].

The persistent bleeding largely potentiates tissue decongestion and leads to loss of blood, relief of capillary net, decrease in venous congestion, decompression of the nerve trunks and endings, increase in lymph flow, positive changes of local hemodynamics, amelioration of hemorheology, increase of oxygen supply, improvement of tissue metabolism, and elimination of tissue ischemia^[22].

CONCLUSION

This study is focused on effect of application of leech before procedure of split thickness skin grafting. At the end of study it is concluded that there is no significant effect of leech

therapy in acceptance of Stsg on bases of selected parameters of study i.e Adherence of graft, Color, Foul smell, Graft edema. But on all over result there are more graft accepted with pre treatment of leech therapy other than without pre treatment of leech therapy. So this study has a wide scope in the field of plastic and reconstructive surgery. When leeches are applied on the already placed graft there are chances of secondary infection by leeches. But in this method we can avoid it and can get excellent results.

REFERENCES

- I. SRB's Clinical methods in surgery; by Sriram Bhat M; second edition; Jaypee publications; chapter 3;p.70
- II. Non healing wounds ; American college of surgeons division of education blended surgical education and training for life; https://www.facs.org/-/media/files/education/core-curriculum/nonhealing_wounds.ashx
- III. *Sushruta, Sushruta Samhita, Chikitsasthana*, chapter 1, verse 6, Hindi translated by Shri. Ambika Dutta Shastri. Varanasi: Chaukhambha Sanskrit Sansthan; Reprint 2014. P. 4
- IV. *Sushruta, Sushruta Samhita, Sutrasthan*, chapter 14 , Hindi translated by acharya P V Sharma Vol.1; 2013 p.100;112
- V. *Sushruta, Sushruta Samhita, Sutrasthan*, chapter 13, verse 11 ;*Jalaukavacharaniyaadhyaya*, Hindi translated by Acharya P V Sharma Vol.1; 2013 p.95
- VI. *Jalauka* (Leech) Application with Splits Thickness Skin Graft (Stsg) On Chronic Non-Healing Ulcer-A Case Study Dr. Vaghasiya C. S. And Dr. Shah H. S. ; European Journal Of Biomedical And Pharmaceutical Science: Issn 2349-8870 Vol 5 Issue 1 ,750-754 ,Year 2018
- VII. Sarvesh Kumar Singh, KshipraRajoria,Medical leech therapy in *Ayurveda* and biomedicine – A review, Journal of *Ayurveda* and Integrative Medicine,2019,ISSN 0975-9476
- VIII. Deganc M, Zdravic F. Venous congestion of flaps treated by application of leeches. *British Journal of Plastic Surgery*. 1960;13:187–192. [PubMed] [Google Scholar]
- IX. Michalsen A, Roth M, Dobos G. *Medicinal Leech Therapy*. New York, NY, USA: Georg Thieme; 2007.
- X. Grassberger M, Sherman RA, Gileva O, Kim CMH, Mumcuoglu KY, editors. *Biotherapy—History, Principles and Practice: A Practical Guide to the Diagnosis and Treatment of Disease Using Living Organisms*. Heidelberg, Germany: Springer; 2013.
- XI. Recommendations for the Use of Leeches in the Reconstructive Plastic Surgery [Kosta Y.](#)

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XII. Whitaker IS, Izadi D, Oliver DW, Monteath G, Butler PE. *Hirudo medicinalis* and the plastic surgeon. *British Journal of Plastic Surgery*. 2004;57(4):348–353.

XIII. Eldor A, Orevi M, Rigbi M. The role of the leech in medical therapeutics. *Blood Reviews*. 1996;10(4):201–209.

XIV. Siddall ME, Trontelj P, Utevsky SY, Nkamany M, Macdonald KS., III Diverse molecular data demonstrate that commercially available medicinal leeches are not *Hirudo medicinalis* . *Proceedings of the Royal Society B*. 2007;274(1617):1481–1487.

XV. Rigbi M, Orevi M, Eldor A. Platelet aggregation and coagulation inhibitors in leech saliva and their roles in leech therapy. *Seminars in Thrombosis and Hemostasis*. 1996;22(3):273–278.

XVI. 46. Fritz H, Oppitz KH, Gebhardt M, Oppitz I, Werle E, Marx R. On the presence of a trypsin-plasmin inhibitor in hirudin. *Hoppe-Seyler's Zeitschrift fur Physiologische Chemie*. 1969;350(1):91–92.

XVII. 47. Seemueller U, Meier M, Ohlsson K, Müller HP, Fritz H. Isolation and characterisation of a low molecular weight inhibitor (of chymotrypsin and human granulocytic elastase and cathepsin G) from leeches. *Hoppe-Seyler's Zeitschrift fur Physiologische Chemie*. 1977;358(9):1105–1117.

XVIII. Seemuller U, Dodt J, Fink E, et al. Proteinase inhibitors of the leech *Hirudo medicinalis* (hirudins, bdellins, eglins) In: Baretand AJ, Salvesen G, editors. *Proteinase Inhibitors*. New York, NY, USA: Elsevier; 1986. pp. 337–359.

XIX. 49. Sollner C, Mentele R, Eckerskorn C, Fritz H, Sommerhoff CP. Isolation and characterization of hirustasin, an antistatin-type serine-proteinase inhibitor from the medical leech *Hirudo medicinalis*. *European Journal of Biochemistry*. 1994;219(3):937–943.

XX. Baskova IP, Khalil S, Nartikova VF, Pashkina TS. Inhibition of plasma kallikrein, kininase and kinin-like activities of preparations from the medicinal leeches. *Thrombosis Research*. 1992;67(6):721–730.

XXI. Hovingh P, Linker A. Hyaluronidase activity in leeches (Hirudinea) *Comparative Biochemistry and Physiology B*. 1999;124(3):319–326.

XXII. Gileva OS, Mumcuoglu KY. Hirudotherapy. In: Grassberger M, Sherman RA, Gileva O, Kim CMH, Mumcuoglu KY, editors. *Biotherapy—History, Principles and Practice: A Practical Guide to the Diagnosis and Treatment of Disease Using Living Organisms*. Heidelberg, Germany: Springer; 2013. pp. 31–76.

TABLES

Table 1. Result in Group A n=14

Criteria	On starting of observation	On end of observation	Difference	%	SD	SE	W	Z	P	S
Adherence Of STSG	1.85	0.43	1.43	76.92	1.08	0.291	105	3.56	<0.001	HS
Discharge	1.21	0.36	0.86	70.59	0.36	0.0971	105	3.56	<0.001	HS
Graft Edema	0	0	0	0	0	0	0	3.5	1	NS
Foul Smell	0.14	0.14	0	0	0	0	3	1.41	0.5	NS
Color	4.64	1.57	3.07	66.15	1.59	0.42	105	3.41	<0.001	HS

Table 2. Results in Group B n=12

Criteria	On Starting Of Observation	On End Of Observation	Difference	%	SD	SE	W	Z	P	S
Adherence of STSG	2	1.25	0.75	37.5	1.45	0.44	78	3.46	<0.001	HS
Discharge	1.33	1.25	0.08	6.25	1.31	0.37	78	3.28	<0.001	HS
Graft Edema	0.17	0.25	-0.08	-50	0.28	0.08	3	1.41	0.5	NS
Foul Smell	0.17	0.17	0	0	0	0	3	1.41	0.5	NS
Color	4.42	2.67	1.75	39.62	2.49	0.71	78	3.13	<0.001	HS

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Table 3. Comparisons of both groups:

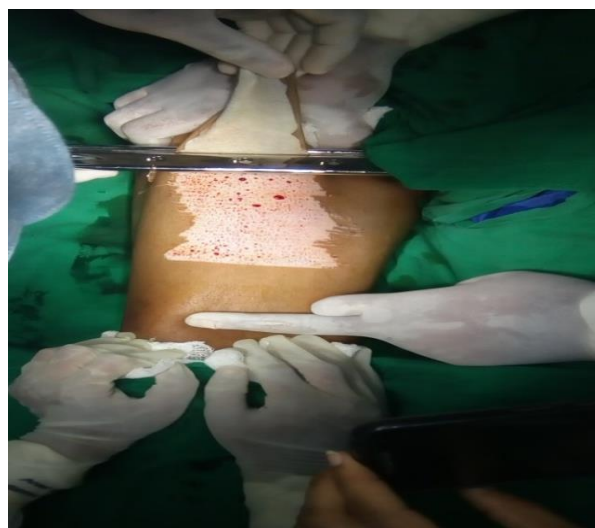
Criteria	Mean of difference		% of difference		Mann Whitney U test	P value	S
	Group A	Group B	Group A	Group B			
Adherences Of STSG	1.43	0.75	76.92	37.5	68	0.341	NS
Discharge	0.86	0.083	70.59	6.25	58	0.092	NS
Edema	0	-0.083	0	-50	77	0.316	NS
Foul Smell	0	0	0	0	84	1	NS
Color	3.07	1.75	66.15	39.62	61	0.212	NS

PHOTOGRAPHS:

Image 1. Von Luchan Chromatic Scale

	1	10			19	28	
	2	11			20	29	
	3	12			21	30	
	4	13			22	31	
	5	14			23	32	
	6	15			24	33	
	7	16			25	34	
	8	17			26	35	
	9	18			27	36	

Image 2. Harvesting Of Graft



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Image 3. Donor Site



3(a) DAY 0



3(b) DAY 14



3(c) DAY 35



3 (d) DAY 60

Image 4. *Jalaukavacharna*



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Image 5. Accepted Grafts



Image 6. Rejection of Graft

