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To Study the Local Effects of *Tugaksheeradi Ghrita Lepa* in the Management of Burn Wound (*Dagdhavrana*)

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ABSTRACT

Background: Management of the burn wound site is still a challenging task for even the most experienced surgeon. Alongside the sequels of burn wound like discoloration, contracture etc. are another aspect of problems of burn injury management. In a country like India where state of the art burn centre is still a distant dream, there is still scope of developing effective, locally available and cheap preparations for burn wound management. Shalyatantra, is the specialized branch of surgical practice of Ayurveda. A very systematic and disciplined approach to burn wound is found in Sushruta Samhita, the Ayurvedic classic from 2nd century CE. **Aims and objectives:** To study the effects of external application of preparation (*lepa)* containing Tugaksheeri (a translucent whitish substance deposited inside nodal joints of the female *Bambousa arundinacae* plants), Plaksha (*Ficus lacor*), Rakta Chandan (*Pterocarpus santalinus*), Guduchi (*Tinospora cordifolia*), Gairika (Red Ochre) and *ghrita* (ghee) on second degree burn wound (*durdagdha dagdhavrana*). Also, to compare the effect of the above preparation with external application of silver sulphadiazine 1% w/w cream on second degree burn wound (*durdagdha dagdhavrana*). **Materials and Methods:** Sixty cases of burn injury (*dagdhavrana*) **Results and Conclusion:** The Ayurvedic compound is effective in the management of burn wound.

KEYWORDS

Burn wound, Dagdhavrana, Local application, Dressing material

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INTRODUCTION

Wound management in burn injury has been a complicated task in front of a surgeon with the altered immune system, frequent altered haemodynamic status, and lack of standard burn care facility in countries like India. With the rise of problem of antibiotic resistance, burn wound care is becoming more challenging and the surgeon has to become extra cautious while choosing antibiotics for local use. Though lots of products are available in the market for this purpose yet an ideal drug with reliable result is yet to arrive. Ayurveda is the rich treasure of healthcare with underutilized potent information in various fields of healthcare. Sushruta Samhita is the classical text book of surgery with standard surgical principles which are relevant in present era also. Burn wound is discussed in detail along with treatment procedure in Sushruta Samhita. Among other classics, Sharangadhar Samhita, mainly a book on medicinal preparations, discusses various local applications for burn wound. In this present study an attempt has been made to re-establish the efficacy of *Tugakhsheeradi lepa* (ointment) as mentioned in Sharangadhar Samhita[1] and also mentioned in Shusruta Samhita[2]. For the assessment of burn wound and systemic management, standard protocol of contemporary modern medicine was maintained. Shusruta's concept was also taken into consideration while giving irrigation, wound bed preparation and care. All necessary aseptic precautions were taken during the procedure under this study and standard statistical methods were used for analyzing the data obtained for the study.

AIMS AND OBJECTIVES

Aims:

To revalidate the efficacy of Ayurvedic preparation for burn wound to make it acceptable, accessible and available for use in present era.

Objectives:

1. To study the effects of external application of preparation (*lepa)* containing Tugaksheeri (a translucent whitish substance deposited inside nodal joints of the female *Bambousa arundinacae* plants), Plaksha (*Ficus lacor*), Rakta Chandan (*Pterocarpus santalinus*), Guduchi (*Tinospora cordifolia*), Gairika (Red Ochre) and *ghrita* (ghee) on second degree burn wound (*durdagdha dagdhavrana*).
2. To compare the effect of the above preparation with external application of silver sulphadiazine 1% cream w/w on second degree burn wound (*durdagdha dagdhavrana*).

MATERIALS AND METHODS

This study was conducted from November 2016 till May 2018. In this study 60 cases of burn injury (*dagdhavrana*), of up to second degree superficial (*durdagdha*) up to 20% of burn in the age group: 5 years to 60 years of either sex arriving within 48 hours from OPD, IPD and casualty of Government Ayurvedic College, Guwahati, were selected for the study. The study was approved by Institutional Ethical Committee with reference number IEC/16 20-128.

Details of materials: Drug preparation was done in State Ayurvedic Pharmacy of Government Ayurvedic College, Guwahati, which is basically a *ghrita* preparation, with classical reference Sharangadhar Samhita (uttarakhanda, chapter 108, verse 11). 10 kg of above *ghrita* preparation of *madhyapaka* was stored in Borosil vessels following strict aseptic measures.

Autoclaved gauze, pad and bandage were used for bandaging of the wound. Standard sterilized instrument and equipment required for dressing was used following all aseptic measures.

Therapeutic approach:

For each patient following protocol was maintained: obtaining identification information, age, history of physiological and pathological conditions of the accident; tetanus prophylaxis; collection of blood and urine for routine examinations, blood group; obtaining intravenous pathways outside of the burning area; primary surgical toilet of the burn; fluid and electrolyte resuscitation to prevent hypovolemic shock; prevention and management of complications of acute phase; infection prevention and control by the rules of asepsia; nutritional and immune support; enteral nutrition when possible and pain therapy throughout evolution.

As local wound care, after proper cleaning the wound is smeared with prepared *ghrita* uniformly in group A and Silver Sulphadiazine in group B. Then the wound is covered with paraffin gauze in group B and then covered with sterilized pad and bandaging done. Contrary to this in group A, following Susrut's principle as the drug contains *ghrita*, instead of paraffin gauze wound was covered with *pissu* (gauze), and then with *kavalika* (pad) and then bandaging was done. Dressing was changed daily.

Outcome parameters: The percentage of wound contraction (%), pain on Visual Analogue Scale; odour, discharge on graded scale and healing time (in days).

Statistical methods:

Comparison of data of both groups was done following standard statistical methods. Demographic data were presented

in number and percentage of total population. Descriptive statistical analysis is summarized as mean ± standard deviation (SD). Significance was defined as P<0.05. Data was analyzed using Graph pad software.

RESULTS

Healing time (in days): The mean healing time for group A was 19.03 days and for group B it was 23.43 days (table 1, figure 1) implying that the trial drug causes significant reduction in healing time compared to Silver sulphadiazine ointment. (Table 1, Figure 1)

Table 1 Healing time (in days):

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	19.03±2.81	0.51	6.7258	<0.001	Statistically highly significant.
B	23.43±2.22	0.41			

*SD- Standard Deviation, SEM- Standard Error of Mean

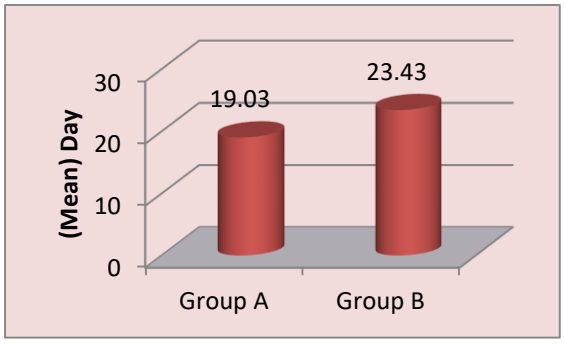

Fig 1 Comparison of mean healing time in both the groups

Pain score: Pain is significantly reduced by application of trial drug compared to the other group on 7th, 14th and 21st days (3.40±0.56, 1.20±0.41 and 0.10±0.31 in group A and 4.27±0.91, 2.13±0.63 and 0.23±0.43 in group B). **(**Table 2.1, 2.2, 2.3, Figure 2)

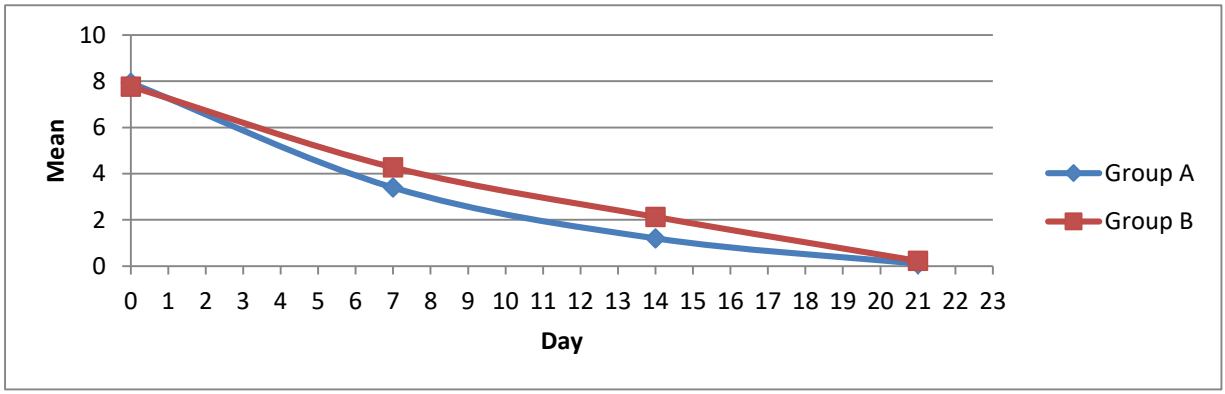

Fig 2 Comparison of mean pain score on various days in both the groups

Table 2.1 Pain score on 7th day:

Group	Mean ± SD	SE	Unpaired 't'	P value	Remark
A	3.40±0.56	0.10	4.4455	<0.001	Statistically highly significant.
B	4.27±0.91	0.17			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 2.2 Pain score on 14th day:

Group	Mean ± SD	SE	Unpaired 't'	P value	Remark
A	1.20±0.41	0.07	6.1400	<0.001	Statistically highlysignificant.
B	2.13±0.63	0.11			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 2.3 Pain score on 21st day:

Group	Mean ±SD	SE	Unpaired 't'	P value	Remark
A	0.10±0.31	0.06	1.3847	0.171	Statistically not significant.
B	0.23±0.43	0.08			

*SD- Standard Deviation, SEM- Standard Error of Mean

Exudates score: Exudates score was significantly reduced by application of trial drug on 7th, 14th and 21st days (1.00±0, 0.47±0.51 and 0.03±0.18 in group A and 1.57±0.50, 0.90±0.31 and 0.10±0.31 in group B). **(**Table 3.1, 3.2, 3.3, Figure 3)

Table 3.1 Exudates score on 7th day

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	1.00±0	0	6.1582	<0.001	Statistically highly significant
B	1.57±0.50	0.09			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 3.2 Exudates score on 14th day

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	0.47±0.51	0.09	4.0086	<0.001	Statistically highly significant.
B	0.90±0.31	0.06			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 3.3 Exudates score on 21st day

Group	Mean ±SD	SEM	Unaired 't'	P value	Remark
A	0.03±0.18	0.03	1.0269	0.309	Statistically not significant.
B	0.10±0.31	0.06			

*SD- Standard Deviation, SEM- Standard Error of Mean

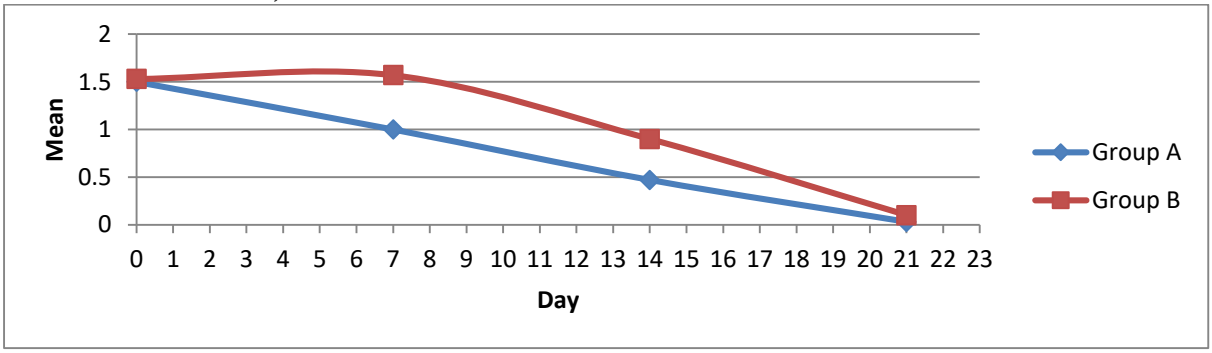

Fig 3 Comparison of mean exudates score in both the groups

Odour: Odour score is significantly reduced by application of trial drug on 7th, 14th and 21st days (0.87±0.63, 0.20±0.41, 0.03±0.18 in group A and 2.53±1.01, 0.83±0.83, 0.13±0.35 in group B). **(**Table 4.1, 4.2, 4.3, Figure 4)

Table 4.1 Odour score on 7th day

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	0.87±0.63	0.11	7.6837	<0.001	Statistically highly significant
B	2.53±1.01	0.18			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 4.2 Odour score on 14th day

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	0.20±0.41	0.07	3.7386	<0.001	Statistically highly significant
B	0.83±0.83	0.15			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 4.3 Odour score on 21st day

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	0.03±0.18	0.03	1.4009	0.167	Statistically not significant
B	0.13±0.35	0.06			

*SD- Standard Deviation, SEM- Standard Error of Mean

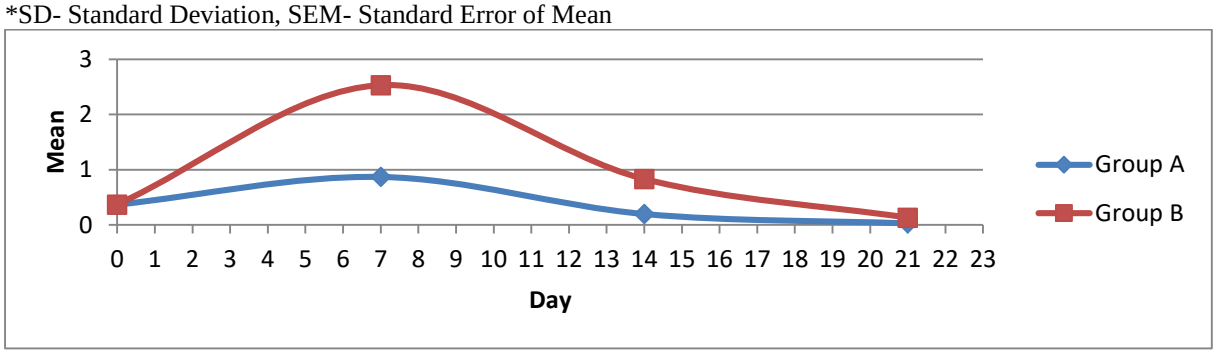

Fig 4 Comparison of mean odour score in both the groups

Percentage wound contraction: There is significant wound contraction on application of trial drug compared to the other group on 7th, 14th and 21st days (12.33± 0.88, 49.87± 1.36, 99.57± 0.97 in group A and 11.60±1.22, 40.83±1.56, 97.80± 1.83 in group B). **(**Table 5.1, 5.2, 5.3, Figure 5)

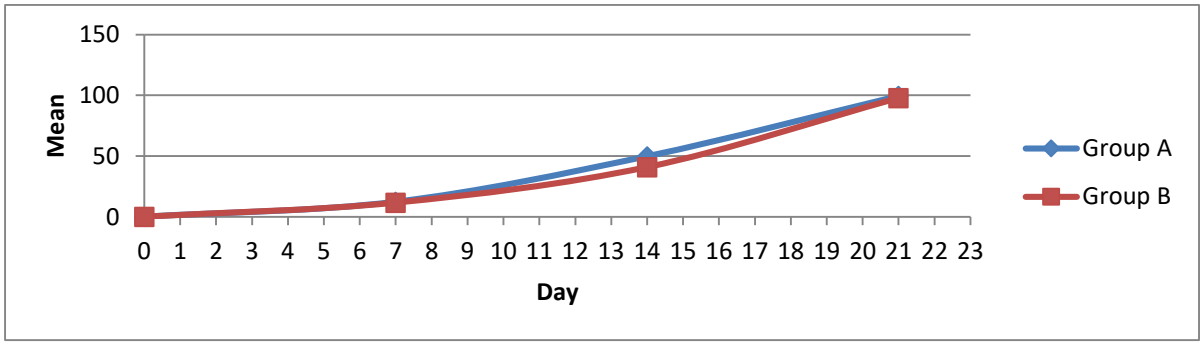

Fig 5 Comparison of mean wound contraction (in %) in both the groups

Table 5.1 Wound contraction (in %) on 7th day:

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	12.33± 0.88	0.16	2.6652	0.001	Statistically highly significant
B	11.60±1.22	0.22			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 5.2 Wound contraction (in %) on 14th day:

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	49.87± 1.36	0.25	23.9629	<0.001	Statistically highly significant
B	40.83±1.56	0.28			

*SD- Standard Deviation, SEM- Standard Error of Mean

Table 5.3 Wound contraction (in %) on 21st day:

Group	Mean ±SD	SEM	Unpaired 't'	P value	Remark
A	99.57± 0.97	0.18	4.6764	<0.001	Statistically highly significant
B	97.80± 1.83	0. 33			

*SD- Standard Deviation, SEM- Standard Error of Mean

DISCUSSION

Though modern technology has revolutionized the field of burn care, still there is a search for better dressing material and topical preparation. There have been renewed interests on herbal medicines in this field.

Burn wound is discussed in Sushruta Samhita as *Dagdhavrana.* Sushruta Samhita described clinical features of four types of burn injury[3].

Plusta: Discoloration (*vivarna),* burning pain with no blisters (*plusyate atimatram*). It corresponds to the features of first degree burn injury.

Durdagdha: Blisters (*sphota*), severe pain, redness, suppuration, (*tibrasosh, daha, raga, paka*), pain lasting for long duration (*vedana chirasya upasamyati*). It corresponds to the features of superficial second degree burn injury.

Samyagdagdha: Not resembling to *atidagdha (anavagarham)* type of burn wound, colour of ripe palm tree fruit *(pakvatalaphalvarna),* neither elevated nor depressed *(susamsthitam) and* along with the features as mentioned above. It corresponds to the features of deep second degree burn injury.

Atidagdha: Sloughing out *(mamsaavalamvana, gatravislesha),* injuries of vessels, ligaments, joints and bones *(sirasnayusandhi-asthivyapaanamatimatram),* fever *(jwara),* burning sensation *(daha),* thirst *(pipasa),* fainting *(murcha),* delayed healing *(chirenruhati),* discoloration *(vivarna)* after healing. It corresponds to the features of third degree.

Satisfactory results were obtained from this clinical study of effects of the Ayurvedic herbo-mineral compound on second degree burn wound (scald and flame). It is observed from our study that the said compound is effective in reducing the healing time compared to control drug. It is also observed that this preparation is effective in reducing discharge and odour of the burn wound thus it is seen to be preventing burn wound infection compared to conventional treatment. The drug is also effective in reducing pain during dressing change and burning sensation. Again it was observed that no adverse reaction or any kind of hypersensitivity was detected during the study. It indicates that the herbo-mineral combination is probably safer than other synthetic drugs.

Statistically, it was found that the trial drug causes significant reduction in healing time compared to silver sulphadiazine ointment. The mean healing time was 19.03 days in trial group and 23.43 days in control group. And the difference was found to be statistically extremely significant. Pain was

significantly reduced by application of trial drug which is comparable to efficacy of silver sulphadiazine ointment. Again pain was lesser in the group treated with Ayurvedic preparation compared to silver sulphadiazine on 7th, 14th and 21st day when measured on numerical pain scale. Burning sensation was significantly reduced by application of trial drug and pain was lesser in the group treated with Ayurvedic preparation compared to silver sulphadiazine on 7th, 14th and 21st day when measured on numerical pain scale. Exudates significantly reduced by application of trial drug compared to control drug. Odour was significantly reduced by application of trial drug. There is significant wound contraction on application of trial drug compared to the other group on 7th, 14th and 21stday. Mean wound contraction was 12.33% in trial group and 11.60% in control group on 7th day; 49.87% in trial group and 40.83% in control group on 14th day and 99.57% in trial group and 97.80% in control group on 21st day.

SUMMARY AND CONCLUSION

Though there have been huge developments in the field of burn care, the concept of burn injury and its treatment described in Sushruta Samhita is still relevant and useful. But there have not been much more clinical studies in terms of modern parameters to revalidate the medicines and treatment principles described therein. Lots of medicinal preparations have been described in Ayurvedic classics. With proper research they can add an extra dimension in the field of wound care in burn injury. Thus it can be concluded that the herbo-mineral compounds can be used in burn wound specially in second degree with success. Though before treatment proper assessment of depth and total body surface area of burn is necessary which needs skill and experience. So with proper facilities, experienced and skilled surgeon can use the Ayurvedic preparation after proper standardization and revalidation.

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