INTRODUCTION

The knowledge of wound is known since antiquity. Since ages the new evolution in wound and its management is going on in each era. A wound which refuses to heal or heals very slowly in spite of best efforts is known as Dushta Vrana. Advancement in science, technology and antibiotics has improved a lot in wound healing but still understanding its pathology and management is in phase of evolution.

Ayurveda the age old and holistic system of medicine offers various tools for management of Dushta Vrana. In Ayurveda Acharya Sushruta, pioneer surgeon, have mentioned various types of wound and their management. The conditions have changed over the period of time along with advanced technologies but the basic principles remain same. The concepts and principles of Vrana such as causes, classification, examination, treatment, bandaging, complications etc told by Acharya Sushruta remain unchanged even in this 21st century also.

The Dushta Vrana is an unsolved problem faced by health care professionals in India and abroad. The hope of these patients is limited to PHC (Primary Health Center) or town hospitals. These centers are already crowded with other common diseases and do not find money and materials to investigate and manage the Dushta Vrana properly. Many times patients remain untreated and that may lead to death due to secondary and systemic infections.

Under these circumstances it is a great need of hour to reproduce the modalities for patients of Dushta Vrana, which will be available everywhere, with minimum cost. Hence a search for more effective and safe method of Vrana Shodhana and Ropana is a demand for management of Vrana.

To achieve good approximation, early healing and acceptable scar, without complications Acharya Sushruta has elaborately explained sixty types of procedures, among them Vrana Shodhana is one. Acharya Sushruta, Charaka, Vagbhatta, Bhavaprakasa, Yogaratnakar, and Sharangadhara have described different remedies like Kvatha, Churna and Lepa having Vrana Shodhana properties. However sushrutha has specifically indicated kaseesadi avachurnana for shodhana and ropana of dushta vrina. So the present study is planned to evaluate the effects of kaseesadi avachurnana in dushta vrina in comparison to jatyadi ghrita application.

MATERIALS AND METHODS

Source of data

The patients of dushta vrina were selected irrespective of their age, sex, cast, creed etc, from outpatient and inpatient department of Shalya Tantra, N.K.J. Ayurvedic Medical College and Hospital, Bidar, Karnataka, India (Ethical Clearance Proposal Number: NKJ/AMC/2007-08/131 Date:07/07/2007).
Method of collection of data
Clinically diagnosed 90 patients of dushta vrana were randomly assigned into 3 groups with 30 patients in each group. The results were assessed on comparative studies of features of BT (Before Treatment) and AT (After Treatment) of all groups. A special Performa was designed for this study.
Group- A (Control group)- treated by Jatyadi ghrita application.
Group- B (Trial group)- treated with Kaseesadi avachurnana.
Group- C (Combined group)- was treated with combination of Jatyadi ghrita and Kaseesadi churna.

Duration of treatment
1 month.

Diagnostic Criteria
Patients having lakshanas of Dushtavrana like Nana Varna, Puti, Puya Mamsa, Sira, Snayu, Amanogna Darshana and Gandhi, Ati Vedana, Daha, Paka, Raga, Kandu, Dushta Shonita Srava, Dhirgakala Anubhandha, Medojusta, Agambheera and Durgandha Vrana.5

Inclusion Criteria
- Patients suffering from non healing ulcer/wound were selected for this study.
- Patients were selected irrespective of sex, age, religion, occupation, economic and educational status.

Exclusion Criteria
Patients with disorders like Malignancy, Tuberculosis, Leprosy and underlying bony lesions were excluded.

Investigations
- Routine investigations.
- Culture and Sensitivity test of discharge
- Histopathological examination wherever necessary.

Intervention
Vrana was exposed properly, cleaned with normal saline, dried with sterile gauze and the sterile gauze was prepared to the shape of wound. Sterile gauze impregnated with Jatyadi ghrita in Group A, Kaseesadi Avachurnana in Group B and combination of both in Group C was kept over the Dushtavrana and a sterile pad was placed on it, dressing was done. All these procedures were performed while wearing a sterile glove.

Time of dressing
Bandaging was done every day once in the morning. If the bandage become wet completely in-between then re-bandaging was carried out.

Observation Period
The patients were observed for shuddha vrana lakshanas or up to 30 days whichever is earlier. Assessment of relief in the signs and symptom was recorded weekly for a period of 1 month.

Assessment Criteria
The patients’ responses were assessed on the basis of subjective and objective criteria by assigning the suitable grade to each parameter. The method adopted for grading was as follows.

<table>
<thead>
<tr>
<th>Subjective parameter</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vedana</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>3</td>
</tr>
<tr>
<td>Moderate</td>
<td>2</td>
</tr>
<tr>
<td>Mild</td>
<td>1</td>
</tr>
<tr>
<td>Nil</td>
<td>0</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varna</td>
</tr>
<tr>
<td>Krisna</td>
</tr>
<tr>
<td>Shwetaratka</td>
</tr>
<tr>
<td>Kapota varna</td>
</tr>
<tr>
<td>Twak samavarna</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Granulation Tissue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent</td>
</tr>
<tr>
<td>Unhealthy</td>
</tr>
<tr>
<td>Moderate</td>
</tr>
<tr>
<td>Healthy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Size of Wound</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 9-12cm</td>
</tr>
<tr>
<td>Within 5-8cm</td>
</tr>
<tr>
<td>Within 1-4cm</td>
</tr>
<tr>
<td>Healed</td>
</tr>
</tbody>
</table>

Area of Vrana in square cms
Group A, Group B and Group C patients wound square cm area was compared with the following formula

\[ \text{Unit healing time} = \frac{\text{Total no. of days of wound healing}}{\text{Initial length x Width x Height}} \]

\[ = \ldots \text{days / square cm}^2 \]

Overall effect of treatment
Uttamma upashaya (marked improvement)– Healed within 2 weeks of treatment.
Madhyama upashaya (moderate improvement) – Healed within 3-4 weeks of treatment.
Alpa upashaya ( mild improvement) – Symptomatic relief at the end of 4 weeks of treatment.
Anupashaya (no improvement) – No response.

Follow-Up Study
After completion of treatment duration, the patients were advised to attend Shalya O.P.D for follow-up at the interval of every 1 month up to 3 months.

RESULTS
The study was carried out on 90 patients of dushta vrana. Out of which first group of 30 patients were treated with jatyadi ghrita application. The second group of 30 patients were treated with Kaseesadi avachurnana for period of 1 month or till the appearance of shuddha vrana lakshanas, whichever is earlier. The third group of 30 patients were treated with a mixture of kaseesadi churna and jatyadi ghrita application for a period of 1 month. The effects obtained in each group are being presented here under separate headings.

Varna
In Group A: Reduction of mean score after treatment was 6.67%.
To Test the effectiveness of treatment,’t’ – test was applied, its value was 2.408 and it was significant at \( p = \ldots \)
Correlation coefficient between before treatment and after treatment was 0.795, it was highly correlated.

In Group B: Reduction of mean score after treatment was 23%.

To Test the effectiveness of treatment, ‘t’-test was applied, its value was 5.525 and it was significant at p = 0.0001. Correlation coefficient between before treatment and after treatment was 0.419, it was highly correlated.

After applying ANOVA test, ‘F’ Value was 5.968 and it was significant at P = 0.021.

In Group C: Reduction of mean score after treatment was 95.2%.

To Test the effectiveness of treatment, ‘t’-test was applied, its value was 21.108 and it was significant at p = 0.0001. Correlation coefficient between before treatment and after treatment was 0.143, it was low correlated.

After applying ANOVA test, ‘F’ Value was 0.586 and it was significant at P = 0.451.

Group B and Group C shows improvements after treatment.

Table 2: Effect of treatment on Varna, Srava, Vedana and Granulation of Dustha Vrana in all groups

<table>
<thead>
<tr>
<th>Effect of treatment</th>
<th>Effect of Groups</th>
<th>No. of cases</th>
<th>Before treatment</th>
<th>After treatment</th>
<th>% of reduction in mean score</th>
<th>S.D. of Mean Difference</th>
<th>S.E of Mean Difference</th>
<th>‘t’ Value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Varna</td>
<td>A</td>
<td>30</td>
<td>2.5</td>
<td>2.333</td>
<td>6.67%</td>
<td>0.37905</td>
<td>0.06920</td>
<td>2.408</td>
<td>&lt;0.023</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>30</td>
<td>2.9</td>
<td>2.23</td>
<td>23%</td>
<td>0.66089</td>
<td>0.12066</td>
<td>5.525</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>30</td>
<td>2.73</td>
<td>0.13</td>
<td>95.2%</td>
<td>0.67466</td>
<td>0.12318</td>
<td>21.108</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Srava</td>
<td>A</td>
<td>30</td>
<td>1.1667</td>
<td>0.8667</td>
<td>25.7%</td>
<td>0.46609</td>
<td>0.08510</td>
<td>3.525</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>30</td>
<td>1.6667</td>
<td>0.8000</td>
<td>52%</td>
<td>0.62881</td>
<td>0.11480</td>
<td>7.5490</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>30</td>
<td>1.2333</td>
<td>0.0333</td>
<td>97.3%</td>
<td>0.40684</td>
<td>0.0728</td>
<td>16.155</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Vedana</td>
<td>A</td>
<td>30</td>
<td>2.1333</td>
<td>1.6333</td>
<td>23.4%</td>
<td>0.50855</td>
<td>0.09285</td>
<td>5.385</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>30</td>
<td>2.2333</td>
<td>0.3667</td>
<td>83.6%</td>
<td>0.62881</td>
<td>0.11480</td>
<td>16.260</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>30</td>
<td>2.2000</td>
<td>0.1667</td>
<td>92.4%</td>
<td>0.66868</td>
<td>0.12208</td>
<td>16.655</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Granulation</td>
<td>A</td>
<td>30</td>
<td>2.6333</td>
<td>1.5667</td>
<td>40.5%</td>
<td>0.73968</td>
<td>0.13505</td>
<td>7.899</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>30</td>
<td>2.6667</td>
<td>0.8000</td>
<td>70%</td>
<td>0.73030</td>
<td>0.13333</td>
<td>14.000</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>30</td>
<td>2.9333</td>
<td>0.3000</td>
<td>89.8%</td>
<td>0.49013</td>
<td>0.08949</td>
<td>29.427</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Size of wound</td>
<td>A</td>
<td>30</td>
<td>1.5000</td>
<td>0.8333</td>
<td>44.4%</td>
<td>0.5467</td>
<td>0.0998</td>
<td>6.679</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>30</td>
<td>1.6667</td>
<td>0.3666</td>
<td>78%</td>
<td>0.5349</td>
<td>0.0976</td>
<td>13.310</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td></td>
<td>C</td>
<td>30</td>
<td>1.4000</td>
<td>0.2666</td>
<td>81%</td>
<td>0.7303</td>
<td>0.1333</td>
<td>8.500</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Graph 1: Distribution of patients based on upashaya and anupashaya

Table 3: Overall results of all groups

<table>
<thead>
<tr>
<th>Results</th>
<th>No. of Patients and Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group A</td>
</tr>
<tr>
<td>Uttama</td>
<td>00</td>
</tr>
<tr>
<td>Madhyama</td>
<td>18</td>
</tr>
<tr>
<td>Alpa</td>
<td>12</td>
</tr>
<tr>
<td>Anupashaya</td>
<td>00</td>
</tr>
</tbody>
</table>
In Group A: Reduction of mean score after treatment was 25.7%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 3.525 and it was significant at $p = 0.001$. Correlation coefficient between before treatment and after treatment was 0.175, it was highly correlated. After applying ANOVA test, ‘F’ Value was 0.889 and it was significant $p = 0.354$

In Group B: Reduction of mean score after treatment was 52%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 7.549 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.000, it was not correlated. After applying ANOVA test, ‘F’ Value was 0.000 and it was significant at $P = 1.00$

In Group C: Reduction of mean score after treatment was 97.3%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 16.155 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.303, it was low correlated. After applying ANOVA test, ‘F’ Value was 3.578 and it was significant at $P = 0.069$

Group B and Group C show improvements after treatment.

Vedana
In Group A: Reduction of mean score after treatment was 23.4%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 5.385 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.298, it was low correlated. After applying ANOVA test, ‘F’ Value was 2.738 and it was significant at $P = 0.109$

In Group B: Reduction of mean score after treatment was 83.6%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 16.260 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.710, it was highly correlated. After applying ANOVA test, ‘F’ Value was 0.141 and it was significant at $P = 0.710$

In Group C: Reduction of mean score after treatment was 92.4%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 16.655 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.143, it was low correlated. After applying ANOVA test, ‘F’ Value was 0.000 and it was significant at $P = 1.000$

Group B and Group C show improvements after treatment.

Srava
In Group A: Reduction of mean score after treatment was 25.7%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 3.525 and it was significant at $p = 0.001$. Correlation coefficient between before treatment and after treatment was 0.175, it was highly correlated. After applying ANOVA test, ‘F’ Value was 0.889 and it was significant $p = 0.354$

In Group B: Reduction of mean score after treatment was 52%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 7.549 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.000, it was not correlated. After applying ANOVA test, ‘F’ Value was 0.000 and it was significant at $P = 1.00$

In Group C: Reduction of mean score after treatment was 97.3%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 16.155 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.303, it was low correlated. After applying ANOVA test, ‘F’ Value was 3.578 and it was significant at $P = 0.069$

Group B and Group C show improvements after treatment.

Granulation Tissue
In Group A: Reduction of mean score after treatment was 40.5%. To Test the effectiveness of treatment ‘t’ test was applied, its value was 7.899 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.029, it was low correlated. After applying ANOVA test, ‘F’ Value was 0.023 and it was significant at $p = 0.880$

In Group B: Reduction of mean score after treatment was 70%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 14.000 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.302, it was low correlated. After applying ANOVA test ‘F’ Value was 2.810 and it was significant at $P = 0.105$

In Group C: Reduction of mean score after treatment was 89.8%. To Test the effectiveness of treatment ‘t’ test was applied, its value was 29.427 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.1750, it was low correlated. After applying ANOVA test, ‘F’ Value was 0.884 and it was significant at $P = 0.355$

Group B and Group C shows improvements after treatment.

Size of Wound
In Group A: Reduction of mean score after treatment was 44.4%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 6.679 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.692, it was highly correlated. After applying ANOVA test, ‘F’ Value was 25.70 and it was highly significant.

In Group B: Reduction of mean score after treatment was 78%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 13.31 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.541, it was highly correlated. After applying ANOVA test, ‘F’ Value was 11.607 and it was significant at $P = 0.002$

In Group C: Reduction of mean score after treatment was 81%. To Test the effectiveness of treatment, ‘t’ test was applied, its value was 8.500 and it was significant at $p = 0.0001$. Correlation coefficient between before treatment and after treatment was 0.330, it was low correlated. After applying ANOVA test, ‘F’ Value was 3.413 and it was significant at $P = 0.75$

Group B and Group C show improvements after treatment.
Case 1: Application of Kaseesadi avachurnana

Figure 1: Before Treatment

Figure 2: During Treatment

Figure 3: During Treatment

Figure 4: After Treatment

Case 2: Application of Kaseesadi churna + Jatyadi ghrita

Figure 5: Before Treatment

Figure 7: During Treatment

Figure 6: During Treatment

Figure 8: After Treatment
DISCUSSION

Effect on varna of dushtavrana
In the jatayadi ghrita group A 6.67% of varna was relieved, in kaseesadi avachurnana group B 23.00% of varna was relieved and in combined group C 95.02% of varna was relieved and the relief was statistically significant $p < 0.0001$ (Table 1). It is thus inferred that the effect of B and C group was better in comparison to group A.

The ingredients of Kaseesadi Churna have Madhura Rasa, Varnya, Krimihara and Lekhaneeya properties hence it does the Raktashodhaka and Raktaprasadhaka action. It purifies Rakta and also removes local dosha which imparts Prakrutha Varna to the Vrana.

The cause of discolouration of the wound site is due to local infection, slough and impaired circulation. The ingredients of drug Kaseesadi Churna have antibacterial, antiplatelet aggregation and vasodilating activity which help to break the pathogenesis and impart normal colour to the healing wound.

Effect on Srava of dushtavrana
In the jatayadi ghrita group A 25.07% of srava was relieved, in kaseesadi avachurnana group B 52.00% of srava was relieved and in combined group C 97.03% of srava was relieved and the relief was statistically significant $p < 0.0001$ (Table 1). It is thus inferred that the effect of B and C group was better in comparison to group A.

The Pakakriya in the Vrana was responsible for Srava, Varna, Vedana, Srava, Akruthi and the severity of Vedana was mainly due to Pravruddha Vata Dosha. The ingredients of drug Kaseesadi Churna have Vata Shamana and Shoolahara properties hence there will be relief in the Vedana of Vrana.

The pain in the wound is mainly due to the inflammatory changes and infection. The ingredients of drug Kaseesadi Churna have the antibacterial, analgesic, antiinflammatory, antihelmenthic, antiseptic, antimicrobial action which helps to stop the formation of pus and subsides pain. By anti-inflammatory property; it reduces edema thereby relieves pain.

Effect on Granulation of dushtavrana
In the jatayadi ghrita group A 40.05% of granulation was improved, in kaseesadi avachurnana group B 70.00% of
granulation was improved and in combined group C 89.08% of granulation was improved and the relief was statistically significant p <0.0001(Table 1). It is thus inferred that the effect of B and C group was better in comparison to group A. The slough was due to increase in collagen and decrease in vascularity and it is main hindrance for formation of healthy granulation tissue along with infection in a Wound/ Dushta Vrana. The ingredients of Kaseesadi Churna has Kashaya, Tikta Rasa, Ushna Veerya, Teekshna, Lekhana, Krimihara, Amasoshana, Chedana properties this leads Shodhana of Vrana. Thus increases the vascularity and does the proliferation of fibroblasts and neovascularisation which helps in formation of granulation tissue.

Effect on Size of the wound of dusthavrana
In the jatayadi ghrita group A 44.04% of size of wound was improved, in kaseesadi avachurnana group B 78.00% of size of wound was improved and in combined group C 81.00% of size of wound was improved and the relief was statistically significant p <0.0001 (Table 1). It is thus inferred that the effect of B and C group was better in comparison to group A.

The Dushta Vrana will have different Aprakritaakruti. The ingredients of Kaseesadi Churna by Kashaya Rasa,Vatahara, Sodhana, Krimihara properties it does improvement in Akruthi. The action of the myofibrils does the wound contractions along with inward healing of margins leading to wound healing, the ingredients of Kaseesadi Churna has bacteriostatic, anti microbial, anti inflammatory property; due to which there is reduction in edema and debridement of necrotic tissue occurs, which helps in improving the wound shape.

DISCUSSION
On the basis of grades of remission in jatayadi grita group A none of the patients had uttama upashaya (marked improvement), 60% patients had madhyama upashaya (moderate improvement), 40% of patients had alpa upashaya (mild improvement) and none of the patients had anupashaya.

In kaseesadi avachurnana group B 33.33% patients had uttama upashaya (marked improvement), 76.67% patients had madhyama upashaya (moderate improvement), 10.00% patients had (mild improvement) and none of the patients had anupashaya (no relief).

In combination group C 33.33% patients had uttama upashaya (marked improvement), 56.66% patients had madhyama upashaya (moderate improvement), 10% patients had alpa upashaya (mild improvement) and none of the patients had anupashaya (no relief). Hence can be inferred that Group B and Group C had better results when compared to Group A.

Culture and Sensitivity of the Drug Kaseesadi churna
The drug was subjected to the sensitivity pattern and its observations over the Nutrient Muller hinton agar plate showed no growth of organisms at the drug smeared area and no contamination of the drug area , but no zone of inhibition seen it means the drug is not killing existing bacteria but arresting its growth hence the drug Kaseesadi churna was found to have bacteriostatic effect.

It can be concluded that Kaseesadi churna inhibit bacterial growth and help in prevention and arrest of infection and thus help in wound debridement i.e. Shodhana and keeps wound area away from infection.

CONCLUSION
It was observed that kaseesadi avachurnana Group B and combination Group C had better effect in relieving the vrana varna, srava, vedena, granulation, akriti and gandha. Hence can be inferred that total effect of Group B and C was better when compared to Group A.

Thus it can be concluded that kaseesadi avachurnana is not only a safe and simple debridementing phytogenic agent, but also effective vrana ropana drug formulation.

REFERENCES

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