

A COMPARATIVE STUDY ON ANTIMICROBIAL ACTION OF KARANJA ARKA AND GOMUTRA ARKA IN DUSTAVRANA WITH SPECIAL REFERENCE TO VENOUS ULCER**Dr. P. V. Vijay Guptha^{*}, Dr. Syeda Ather Fathima², Dr. Shivalingappa J. Arakeri³, Dr. Mohasin Kadegaon⁴ and Dr. Geethanjali Hiremath⁵**¹Final Year PG Scholar, Department of Shalya Tantra, Taranath Government Ayurvedic Medical College, Ballari (Karnataka, India)²Principal, Department of Shalya Tantra, Taranath Government Ayurvedic Medical College, Ballari (Karnataka, India)³Professor & HOD, Department of Shalya Tantra, Taranath Government Ayurvedic Medical College, Ballari (Karnataka, India)^{4,5}Assistant Professor Department of Shalya Tantra, Taranath Government Ayurvedic Medical College, Ballari (Karnataka, India)***Corresponding Author: Dr. P. V. Vijay Guptha**

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ABSTRACT

Acharya Sushruta defines vrana as, a wound when heals leave a scar which remains till death. Any Vrana which gets dushita (dosha, or other factors) is called Dustavrana. In modern science, ulcer refers to discontinuity in the covering epithelium, skin or mucous membrane and may either follow molecular death of surface epithelium or its traumatic removal. Venous ulcers constitute 81% of leg ulcers. India has high prevalence rate of 4.5 cases per 1000 population in a year. Antimicrobial resistance is a global health and development threat. Misuse and overuse of antimicrobials are the main drivers in the development of Drug-resistant pathogens. A total 40 patients were randomly allotted into 2 groups namely group A with trail drug i.e. Karanja Arka and group B with standard drug i.e. Gomutra Arka with 20 patients in each group. Assessment was made on subjective parameters like pain, itching, swelling, foul smell and objective parameters like size, margin, floor, discharge, bacteria, culture & sensitivity response to 1st line of antibiotics. Observations were made before and after treatment. Assessment of organism, gram stain, azithromycin, amikacin, cefixime, ceftriaxone, ciprofloxacin, doxycycline, gentamicin, levofloxacin, linezoild, norfloxacin & tetracycline in group A showed 43.58%, 46.66%, 41.02%, 36.36%, 18.84%, 17.39%, 32.43%, 40%, 37.03%, 27.77%, 14.28%, 35.55%, 38.23% improvement and in group B 30.43%, 30.30%, 38.09%, 36.92%, 14.75%, 14.51%, 34.09%, 30.765, 37.50%, 37.83%, 9.25%, 30.95%, 17.14% improvement respectively. Based on the data we can say Karanja Arka is more efficacious than Gomutra Arka in Antimicrobial activity.

KEYWORDS: Dustavrana, Arka, Antimicrobial resistance.**INTRODUCTION**

Acharya Sushruta defines vrana as, a wound when heals leave a scar which remains till death.^[1] Definition of Shalyatantra clearly expresses the prime importance given for vrana by ending with 'vrana vinischayartham cha'.^[2] The stages of wound healing also been explained very clearly like, Dustavrana, Shuddha, Ruhyamana and Ruda vrana.^[3] Any Vrana which gets dushita (dosha, or other factors) is called Dustavrana.^[4] Features of Dustavrana are which is painful, excessive discharge, itching, different shape, not healing etc.^[5]

In modern science, ulcer refers to discontinuity in the covering epithelium, skin or mucous membrane and may either follow molecular death of surface epithelium or its traumatic removal.^[6] Venous ulcers constitute 81% of leg

ulcers. India has high prevalence rate of 4.5 cases per 1000 population in a year.^[7] Its basic cause being abnormal venous hypertension in the lower 1/3rd of leg, ankle and dorsum of foot due to varicosity of veins or DVT or venous incompetence. Venous ulcers are painful (acute) or non-painful (chronic), having sero-sanguineous discharge, hyperpigmentation, induration and tenderness of the surrounding skin.

Management includes i.e. Compression stockings, foot end elevation, Passive and active movements of calf muscle, antibiotics and daily dressing with use of betadine or eusol solution. Most of the ulcers heal by this approach. Rest needs surgical intervention like Sclerotherapy, Bypass operation Valuvular repair and valuvular transplant and larger ulcers require Split Skin

Graft. These treatments are costlier, becoming unaffordable with poor prognosis and high recurrence rate.^[8]

Acharya Sushruta explained in detail saptoupakramas, ekadasha upakramas and shasti upakramas for management of wound. Prakshalana (Parisheka) is one among Shasti upakrama. Prakshalana is basically advocated not only with a purpose of cleansing the Vrana, but a purpose of removing Vrana dosha like pooya (i.e. slough) and bring Vedanopashamana converting Dustavrana into Shuddha Vrana.^[9,10]

In Ayurveda, Arka Kalpana is rarely practiced which has been explained by Lankapathi Ravana in treatise Arka Praksha explained in detail about its preparation, storage and utility.^[11] This Kalpana having shelf life of 1 year without adding any preservatives. It is colourless with more active principles been extracted. Arka Kalpana is having teekshna, sukshma guna along with vyavayi guna which helps in faster result. Gomutra Arka and Karanja Arka having shodhana and krimighna property been used in the management of Dustavrana to evaluate its antimicrobial property.

AIM AND OBJECTIVES

- ▶ To evaluate the Antimicrobial and Vranashodhana action of Gomutra Arka prakshalana in Dustavrana with special reference to venous ulcer.
- ▶ To evaluate the Antimicrobial and Vranashodhana action of Karanja Arka prakshalana in Dustavrana with special reference to venous ulcer
- ▶ To compare the Antimicrobial and Vranashodhana action of Gomutra Arka and Karanja Arka in Dustavrana with special reference to venous ulcer

MATERIALS AND METHODS

STUDY DESIGN: A total 40 number of patients of Venous ulcer who fulfilled the criteria were included in the study and were randomly allotted into two groups namely Group – A and Group – B with 20 patients each.

Group A: For the patients in Group A, Karanja Arka was used for prakshalana and dressing.

Parameters for wound assessment.

Table 1: Parameters of wound assessment.

Grade	Pain
1. Visual Analog Scale(VAS)	0-1 No pain
	2-3 Mild pain
	4-5 Uncomfortable
	6-7 Distressing
	8-9 Intense
	10 Worst possible
2. Itching	0 Absent
	1 Present
3. Foul smell	0 Absent
	1 Present

Group B: For the patients in Group B, Gomutra Arka was used for prakshalana and dressing.

Duration of Treatment: 21 days.

The procedure of pus collection for both the groups: under all aseptic precautions the surrounding of the wound was cleaned and the discharge was collected with sterile pus culture swab and subjected to culture and sensitivity test from Amrutha Diagnostic and Prime labs, Ballari.

Procedure

- Patient was advised to sit.
- Ulcer was cleaned with normal saline.
- Karanja Arka Prakshalana in Group A and Gomutra Arka Prakshalana in Group B done.
- Karanja Arka Soaked gauze applied for Group A & Gomutra Arka Soaked gauze applied for Group B
- Then covered with sterile pad and dressing was done by roller bandage.

Inclusion criteria

1. Patients with age group of 20-70 years.
2. Patients with features of venous ulcer i.e. pain, itching, swelling, foul smell, serous or sero-sanguineous discharge and venous ulceration.
3. Ulcer selected within two year of occurrence.
4. Size : equal or below 10*5cm

Exclusion criteria

1. Patients suffering from systemic illness like TB, Leprosy, STD etc.,
2. Patients with Type 2 Diabetes Mellitus and Hypertension.
3. Patients suffering from gangrene, burns and sepsis.

Parameters for Assessment of antimicrobial action:

1. Bactria detected
2. Overall progress for sensitivity, resistance, intermediate resistance to the 1st line of antibiotics.

Size: A sterile blotting paper is placed over the ulcer and pressed with uniform pressure. The impression is directly measured at its maximum length and breadth.

Table 2: Parameters of wound assessment.

Grade	Margin	Floor	Discharge
0	well defined	Wound healed	No discharge
1	With advanced border of epithelium	Evenly spread pink granulation tissue	Mild discharge (wets 2x2 cm gauze piece/day)
2	No advancing border of epithelium	Evenly spread beefy red granulation tissue	Moderate discharge (wets 2x2 cm 2 gauze per day)
3	Not Well defined	No healthy granulation tissue or covered with slough	Severe discharge (wets 2x2 cm>2 gauze per day.

OBSERVATIONS

All 40 patients of Dustavrana (Venous Ulcer) have been analyzed for the assessment parameters like bacteria detected, overall progress for sensitivity, resistance, intermediate resistance to the 1st line of antibiotics and pain, itching, foul smell, swelling, size, margin, floor and discharge.

RESULTS

The assessment parameters like bacteria, sensitivity, resistance and intermediate resistance to 1st line antibiotics, Pain, Itching, Foul smell, Swelling, Size, Margin, Floor & discharge were subjected to Wilcoxon Signed Rank Test to compare the mean rank within the group and Mann Whitney U test to compare the Mean Rank difference Values between the groups & draw the conclusion.

Table 3: Comparative results of group A and group B of observations.

Characteristics	Group-A			Group-B		
	Mean Score		Percentage of Relief	Mean Score		Percentage of Relief
	BT	AT		BT	AT	
PAIN	1.35	0.50	62.96	1.00	0.30	70
ITCHING	0.70	0.05	92.85	0.50	0.05	90
FOUL SMELL	0.50	0.00	100	0.40	0.00	100
SIZE	2.00	1.65	17.50	2.20	1.85	15.90
SWELLING	0.70	0.55	21.42	0.20	0.15	25
MARGIN	1.70	0.95	44.11	1.25	1.05	16
FLOOR	2.05	0.95	53.65	2.10	1.15	45.23
DISCHARGE	1.25	0.15	88	1.20	0.00	100

Table 4: Comparative results of group A and group B of culture & sensitivity.

Characteristics	Group-A			Group-B		
	Mean Score		Percentage of Relief	Mean Score		Percentage of Relief
	BT	AT		BT	AT	
ORGANISM	1.95	1.10	43.58	2.30	1.60	30.43
GRAM STAIN	1.50	.80	46.66	1.65	1.15	30.30
AZITHROMYCIN	1.95	1.15	41.02	2.10	1.30	38.09
AMIKACIN	1.10	.70	36.36	1.30	.95	26.92
CEFIXIME	3.45	2.80	18.84	3.05	2.60	14.75
CEFTRIAZONE	3.45	2.85	17.39	3.10	2.65	14.51
CIPROFLOXACIN	1.85	1.25	32.43	2.20	1.45	34.09
DOXYCYCLINE	1.50	.90	40	1.95	1.35	30.76
GENTAMICIN	1.35	.85	37.03	1.60	1.00	37.50
LEVOFLOXACIN	1.80	1.30	27.77	1.85	1.15	37.83
LINEZOLID	2.80	2.40	14.28	3.15	2.85	9.52
NORFLOXACIN	2.25	1.35	35.55	2.10	1.45	30.95
TETRACYCLINE	1.70	1.05	38.23	1.75	1.45	17.14

Table 5: Effect of treatment on observation.

Effect of Treatment on Observation			
Class	Grading	No of patients in Group A	No of patients in Group B
0-25%	Poor Response	2	2
26%-50%	Mild Response	3	2
51%-75%	Moderate Response	3	4
76%-100%	Marked Response	12	12

Table 6: Effect of treatment on culture & sensitivity.

Effect of Treatment on Culture Sensitivity			
Class	Grading	No of patients in Group A	No of patients in Group B
0-25%	Poor Response	06	05
26%-50%	Mild Response	12	15
51%-75%	Moderate Response	02	00
76%-100%	Marked Response	00	00

**Figure 1: Results in group A****Figure 2: Results in group B.**

DISCUSSION

Dustavrana being a chronic ailment causes long term suffering to patient. It causes rarely morbidity in patients. In Ayurveda Acharya Sushruta defines Vrana as, a wound when heals leave a scar which remains till death. Scar formed by improper healing process is a complication remains till death. No science has vast options for management of vrana i.e. shasti upakrama explained in Ayurveda. Acharya explained restoring the normal complexity of the scar by vaikrutapaham. Scar management is even more difficult in modern science also.

Even though healing is a natural process it is a complex mechanism which includes highly organized cellular, humoral and molecular mechanisms. Any factors interrupt this process will end up in abnormal wound healing. Obstructing these inhibitory factors is the main goal of sthanika shodhana chikitsa.

According to Ayurveda

In general Arka Kalpana has sukshma, vyavayi and laghupaki guna. Where sukshma guna helps in drug delivery to minute srotas. Vyavayi guna helps in faster absorption and action.

- **Karanja Arka**
 - Unhealthy tissue in Vrana is due to samakapha which is responsible for kandu and srava. Katu kashaya rasa helps in attaining niramaavastha of kapha managing kandu and srava.
 - Samapitta is responsible for vikruta gandha of vrana which is managed by tikta kshaya rasa.
 - Pain is due to sheeta guna of vayu which is countered by ushna veerya.
 - It is Kaphavata hara so can be used in sama vata and sama kapha conditions.
 - Antimicrobial property is due its krimihara action.
 - Also the tikta katu kashaya rasa has krimihara action.
- **Gomutra Arka**
 - Bio-enhancer action directly affects the local metabolism of vrana by increasing the nutrient supply and oxygen supply.
 - It had lekhana karma which acts on samakapha (unhealthy tissue) and removes pooya from the vrana.
 - Kshara guna present in gomutra doesn't provide a favourable environment for microbes to grow and

acts as krimighna. Scrapping of unhealthy granulation tissue is also achieved.

- Pain is managed by ushna veerya.
- Kaphavata hara action makes it suitable for both samavata and samakapha vrana, which are responsible for inflammation.

According to Modern Science

• **Karanja Arka**

- Pongamin, Tannins, Flavonoids, Quinines, karanjin, Pongamol, Betacyanins, Alkaloids, Glycosides, Trepnoids, Phenols, Aminoacids, Protein, Anthroquiones, Triterpenoid are the phytochemicals present in aqueous extract (Arka Kalpana) of Karanja Beeja.
- Karanjin is phytochemical which is hydrophilic in nature, present in karanja beeja.
- The hydrophilic nature is responsible for removing excess watery element from wound bed and maintains its hydration, helping in proper wound healing. It acts by lysis of bacteria by degrading the cell wall and affecting the cytoplasmic membrane.
- The antibacterial effectiveness of tannins is due to their ability to pass through the bacterial cell wall up to the internal membrane, interference with the metabolism of the cell, and as a result their destruction.
- Alkaloids and Flavonoids also exhibit the potent antibacterial activity on wide range of microorganisms.
- Phenols exhibits strong antimicrobial activity.

• **Gomutra Arka**

- Gomutra Arka contains water (95%), urea (2.5%), enzymes (2.5%), minerals, 24 types of salts and hormones. It also contains iron, ammonia, sulfur, urea etc.,
- Gomutra enhances the phagocytic activity of macrophages.
- Enzymes are responsible for enzymatic debridement of unhealthy tissue.
- Urea present in gomutra acts as natural chemical debridement agent. This reduces the slough and bacterial count.
- Gomutra also contains phenols which exhibits strong antimicrobial activity.

CONCLUSION

Vrana is defined as a wound when heals leave a scar which remains till death. When Vrana is vitiated by doshas it is called as Dustavrana. Karanja Arka is prepared from karanja beeja and water, which is a simple, effective and economic preparation. It has katu, tikta, kashaya rasa and ushna veerya, which helps in shodhana of Vrana. It also had krimighna property which acts as antimicrobial nature. Gomutra Arka is katu rasa, ushna veerya, lekshana property which does shodhana of Vrana. Kshara guna doesn't provide suitable environment for bacterial growth.

- In Group A: Relief from Pain was 62.96%, Itching was 92.85%, Foul smell was 100%, Size reduction was 17.50%, Relief from swelling was 21.42%, Improvement in Margin was 44.11%, Improvement in Floor was 53.65% and Reduction in Discharge was 88%.
- In Group B: Relief from Pain was 70%, Itching was 90%, Foul smell was 100%, Size reduction was 15.90%, Relief from swelling was 25%, Improvement in Margin was 16%, Improvement in Floor was 45.23% and Reduction in Discharge was 100%.
- In Group A: Improvement in Organism was 43.58%, Gram Stain was 46.66, Azithromycin was 41.02%, Amikacin was 36.36%, Cefixime was 18.84%, Ceftriaxone was 17.39%, Ciprofloxacin was 32.43%, Doxycycline was 40%, Gentamicin was 37.03%, Levofloxacin was 27.77%, Linezolid was 14.28%, Norfloxacin was 35.55% and Tetracycline was 38.23%.
- In Group B: Improvement in Organism was 30.43%, Gram Stain was 30.30, Azithromycin was 38.09%, Amikacin was 26.92%, Cefixime was 14.75%, Ceftriaxone was 14.51%, Ciprofloxacin was 34.09%, Doxycycline was 30.76%, Gentamicin was 37.50%, Levofloxacin was 37.83%, Linezolid was 9.25%, Norfloxacin was 30.95% and Tetracycline was 17.14%.

After statistical interpretation of comparative antimicrobial and observation results of both Group A and Group B by Wilcoxon Signed Rank Test and Mann Whitney U Test.

- Overall relief in Group A is 60% and Group B is 57.76% in observation parameters.
- Overall relief in Group A is 33.01% and Group B is 27.13% in antimicrobial study (culture and sensitivity)

Based on the above data we can say Karanja Arka is more efficacious than Gomutra Arka in Antimicrobial activity.

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