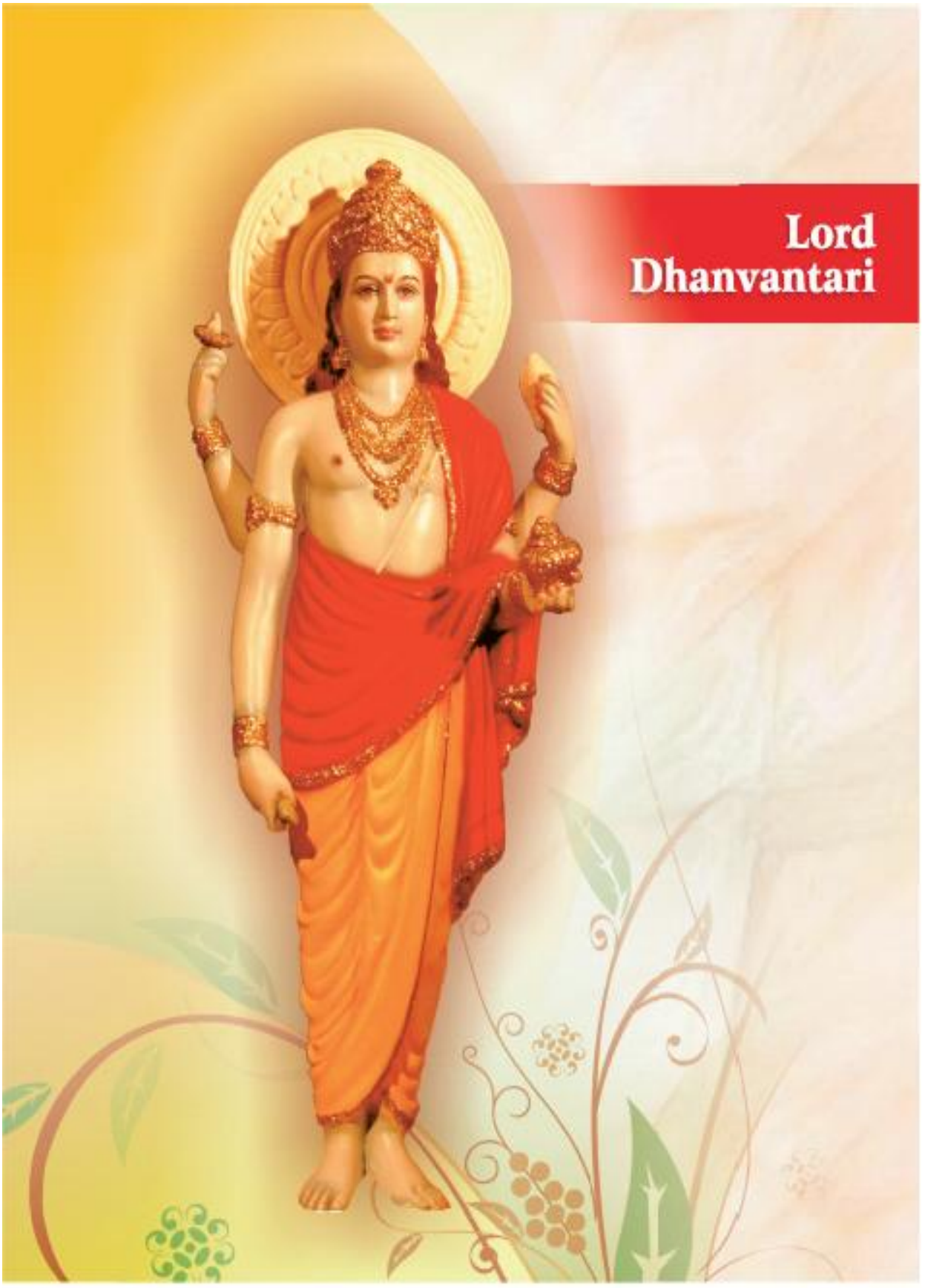
Lord
Dhanvantari

"THE ROLE OF LOCAL APPLICATION OF *DARUHARIDRA (BERBERIS ARISTATA)* AND *MADHU (*HONEY) IN *DUSHTAVRANA SHODHANA* W.R.T. CULTURE SENSITIVITY."

A THESIS SUBMITTED TO

BHARATI VIDYAPEETH UNIVERSITY, PUNE

FOR AWARD OF DEGREE OF

DOCTOR OF PHILOSOPHY IN SHALYATANTRA

UNDER THE FACULTY OF AYURVED

SUBMITTED BY

DR. RAHUL VASANTRAO KADAM

UNDER THE GUIDANCE OF

PROF.DR. UMESH A. VAIDYA

RESEARCH CENTRE

BHARATI VIDYAPEETH DEEMED UNIVERSITY

COLLEGE OF AYURVED, PUNE. 411043.

APRIL 2016

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled **"**The Role of Local application of Daruharidra *(Berberis Aristata* DC.) and *Madhu* (Honey) in *DUSHTAVRANA Shodhana* w.r.t. Culture Sensitivity**"** submitted by me to the Bharati Vidyapeeth University, Pune for the degree of **Doctor of Philosophy (Ph.D.)** in ***SHALYATANTRA*** under the faculty of ***AYURVED*** is original piece of work carried out by me under the supervision of Dr Umesh A. Vaidya.

I further declare that it has not been submitted to BHARATI VIDYAPEETH DEEMED UNIVERSITY COLLEGE of ***AYURVED***, PUNE. 411043. This or any other university or Institution for the award of any degree or Diploma. I also confirm that all the material which I have borrowed from other sources and incorporated in this thesis is duly acknowledged. If any material is not duly acknowledged and found incorporated in this thesis, it is entirely my responsibility. I am fully aware of the implications of any such act which might have been committed by me advertently or inadvertently.

Place :
Date : / /

Dr. Rahul V. Kadam

CERTIFICATION OF GUIDE

This is to certify that the work incorporated in the thesis entitled "The Role of Local application of *DARUHARIDRA (Berberis Aristata DC.)* and *MADHU* (Honey) in *DUSHTAVRANA Shodhana* w.r.t. Culture Sensitivity" Submitted by Dr. Rahul V. Kadam for the degree of **'Doctor of Philosophy' (Ph.D.)** in the subject of ***SHALYATANTRA*** under the faculty of ***AYURVED*** has been carried out in the Department of ***SHALYATANTRA*** Bharati Vidyapeeth's College of ***AYURVED***, Pune 411043, Pune, during the period from 2012 to 2016 under my direct supervision/ guidance.

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CERTIFICATE

This is to certify that the work incorporated in the thesis entitled, "The Role of Local application of *DARUHARIDRA (Berberis Aristata DC.)* and *MADHU* (Honey) in *DUSHTAVRANA Shodhana* w.r.t. Culture Sensitivity" for the degree of **'Doctor of Philosophy' (Ph.D.)** in the subject of ***SHALYATANTRA*** under the faculty of ***AYURVED*** has been carried out by Dr. Rahul V. Kadam in the Department of ***SHALYATANTRA*** at Bharati Vidyapeeth Deemed University, College of ***AYURVED*,** Pune during the period from 2012-13 to 2015-16 under the guidance of Dr. Umesh A. Vaidya.

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Dr. Rahul V Kadam

INDEX

INTRODUCTION

INTRODUCTION

Ayurved, the most ancient science is one of the most promising branch of medical science. The recent advances and research in Ayurved have not only promoted its utility but also established its importance in the medical field. *Shalyatantra*, one of the *Ashtanga* of *Ayurved* is gaining popularity over the masses.

Ayurved, more a science of life than only a medical science, gives more importance to preventive measures and complete curing of a disease with a minimum chance of recurrence.

Sushrut – the Father of Indian surgery has scientifically classified in a systemic manner a wealth of clinical material and the principles of management which are valid even today.

वृणोति यस्मादरूढ़ेऽपि व्रणवस्तु न नश्यति ।

आदेहधारणात् तस्मात् व्रण इत्युच्यते बुधैः॥

सु.सू.२१/४०

The most commonly occurring condition in *Shalyatantra* is *VRANA* (wound/ injury). While explaining the scope of *Shalyatantra*, *Sushrut* too has mentioned ***Vrana Vinishchayartham*** as a major part of *Shalyatantra*.

For *Sushrut*, health was not merely a freedom from disease but a normal state of mind, body and soul. (Su.Su.15/41) He conceived of a total management of the disease from the earliest stage of vitiation of *Doshas* to total recovery in which he insisted on bringing back the site of the lesion to normalcy in all respects. Thus it may well be said that *Sushrut's* management was more thorough than even conceived today. Today, wound is said to have healed when epithelization is complete. But *Sushrut* would employ '***Vaikritapaham***' [1] measures which will bring back the normal color and surface and even hair; [2] thus he can be rightfully called the originator of cosmetic surgery.

The history of medical science starts with the art and skill of wound managment. Treatment of the wound is probably the first medical problem

faced by human beings. The frequency of injuries is more common than any other disease.

Even though healing of *Vrana* is a natural process of the body, the *Vrana* should be protected from Doshadusthi and from various micro-organisms, which may afflict the Vrana and delay the normal healing process or complicate it. So, for the early and uncomplicated healing of *Vrana,* treatment is necessary.

Centuries ago, injury in the battle-field due to being hit by arrows was one of the common problems, along with contamination of the wound. Falling from trees, fall from heights, crushing against stone or hard materials, animal bites were the other causes for injury. The contamination of the wound due to various micro-organisms delayed the process of wound healing. Bleeding, pain, infection & cicatrisation were and are the main complications of a wound which require immediate treatment.

In *Sushrut Samhita*, *Vrana* along with its complication and management have been discussed in detail. In the *Vranitopaasaneeya Adhyaya* he explains that, "If the *Raksha Karma* of *Vrana* is proper then the *nishachara's* leave the patient, in the same way as the *Mrugaas* (deer) run away from the jungle terrified by a lion." (Su.Su.19)

Classification of traumatic wounds, their prognostic evaluation and management, insistence on primary suturing in clean wounds, avoidance of sepsis and excision of extruded omentum and careful suturing of intestinal perforation in the management of perforating abdominal wounds, etc. are remarkable for their modern outlook. (Su. Chi.3) further, he was the first to recognize the similar basic pathology of all thermogenic injuries-hot or cold; he coined the word '*Shita dagdha*' (cold burn), a term which has come in modern surgery only recently. (Su. Sut.13/38)

The fast life style of society today, the intake of unhealthy diet such as fast food, alcohol, aerated drinks and un-nutritional diet are the causative factors of doshadushti in the human body leading to innumerable diseases and condition. ***VRANA*** **one such condition is better known as**

DUSHTAVRANA*[3] after its causative factors.** Similarly an *AGHATAJ VRANA* (traumatic injury) can also be converted into a ***DUSHTAVRANA due to various reasons. eg. *Hetu sevan*, improper hygiene etc.

Thus it is quoted,

Infected wound *(Dushtavrana)* is a long standing ulcer with profuse discharge and slough, where clearing slough and enabling drug to reach the healthy tissue is more important.[18]

A variety of drugs and formulations have been tested for their clinical efficacy in *Dusthavrana* and yielded good results.

The classics have noted *atisanvruto, ativivruto, atikathino, atimrudu, utsanna, avasanna, atisheeta, atiushna, Krishna, rakta, peeta, shukla Varna, vedana, daha, paka, raga, kandu, shopha, pidaka, dushta-shonitsravi, dirghakalanubandhi, putipuyasravi, atigandhadiyukta* as the symptoms of ***DUSHTAVRANA.***

Acharya Sushrut has described the *Ruhyamana Vrana, Samyaka Rudha Vrana,* and *Dushtavrana* on the basis of ancient pathophysiology of wound. He has also described the types of wound in two categories mainly *Nija* and *Agantuja.*

Usage of various types of leaves or soil was the treatment to arrest bleeding. Quest for knowledge by ancient people led to many investigations and assumptions. Gradually *dravyas* with better results were selected and tried in different forms.

In healing of *Vrana*, local treatment is also important along with oral medications. *Dushtavrana* is an ulcer with profuse discharge and slough, where clearing slough and enabling drug to reach the healthy tissue is more important. Slough can be cleared by using surgical instruments or oxidizing agents where healthy granulation tissues may be damaged.

'Nowhere is the gap between basic research and clinical application more glaring than in the biology of wound healing'

- Earl A. Peacock Jr. (1983)

There is no doubt, that the art of surgery revolves around the *Vrana* and its essence is uncomplicated healing. The society believes *"Time is a Great Healer"* but surgeons are dissidents in this respect, they need early and uncomplicated healing.

A vast scope of research exists in the field of Ayurved for the benefit of the science and humanity at large. It is true that number of scientists and medicine experts are working on various preparations which may help in achieving '*Vrana shodhana'* and '*ropana'*. A close study of *Ayurved* reveals that a number of plants were used to achieve this goal. A follower of *Shalyatantra* needs to establish the effective *Ayurvedic* management of the same.

In the combination quoted below *Daruharidra*[4] *(Berberis aristata DC.)* is one of the ingredients, that possesses properties of *Shodhana* (cleansing), *Ropana* (healing), *Vedanashamana (analgesic)*, *Shothaharana* (anti-inflammatary and reducing swelling) *and* bactericidal. The rest of the ingredients also show similar properties.

कासिसे सैन्धवे किण्वे वचायां **रजनीद्वये** ।
शोधनाङ्गेषु चान्येषु चूर्णं कुर्वीत शोधनम् ॥

सु.सू.३७ /२०

The use of *Daruharidra* as a single herbal drug in *Dushtavrana,* was not only challenging but was also supported by efficacy references of experimental studies. Besides, no study has been conducted so far to assess the efficacy of *Daruharidra* and *Madhu* on *Dushtavrana* especially **in context of its culture sensitivity**.

Dhanwantari Nighantu highlights its *Ruksha, Ushna* and *Tikta guna* and ***Vranaghna* and *rujanashan karma***. *Bhavprakash*, at the same time quotes its *Rasayana* and *Chhedana karma*. Its *Tikta-Kashaya rasa, Katuvipaka, Ushnavirya, Laghu-Ruksha guna* and *Pitta-Kaphaghna karma,*

help its action against ***Dushtasrava*** **(pus) and** ***Kapha, Kledanashana***, thus in turn helping in ***Vranashodhana*** **and** ***Ropana*** **with** ***Vedanashamana*** **and** ***Shothaharana***. **The alkaloid** ***Berberine*** **possesses antibacterial and anti-inflammatory activities**. The plant extract is also being used in herbal antiseptic cream. (Databased on Medicinal plants used in *Ayurveda*, vol.1 page 121 CCRAS)

Another drug is ***MADHU***[5] (Honey) with its properties of *Shodhana* and *Ropana. Madhu*, an animal product is widely used in a number of diseases, ranging from mere cough to obesity. It has properties of *Madhur-Kashaya rasa* and *Sheeta Virya* and is *Laghu, Ruksha, Grahi, Sukshma, Chhedi, Vrushya* and *Hridya* with its *Karma* of *Srotovishodhana.* It is also as ***Vranashodhana***, ***Ropana*** and *Saukumaryakaram. Kaiyadev Nighantu* has elicited these attributes of ***MADHU*** in detail.[10,11]

निम्बपत्रघृत क्षौद्र दार्वी मधुक संयुता ।
वर्ति स्तिलानां कल्को वा शोधयेद्रोपयेद्व्रणम् ॥ ११

यो. र. शोधनरोपन विधी

The previous work done helped to ascertain the lacunae in the previous research & thus enabled us to plan the work methodically.

None of the previous work includes the external application of ***Daruharidra + Madhu*** especially so, in ***Dushtavrana***. With these lacunae in mind our study to prove the efficacy of these two drugs viz. *Daruharidra* and *Madhu* as an external application on *Dushtavrana* w.r.t. Culture Sensitivity was planned. It was necessary to utilize a medium that would not only aid in the application of *Daruharidra* but also add to its efficacy as a synergist. Hence, ***MADHU*** (Honey) with its semi-liquid consistency, *Shodhana, Ropana* and antimicrobial property was the apt drug of choice.

Review of Literature

REVIEW OF LITERATURE

Review of Literature-

The study on the phytochemical, pharmacological efficacy and antimicrobial activity of crude extract from *Berberine aristata* was conducted by Dipti Potdar, R R Hirwani, Shivakami Dhulap and published in Fitoerapia, Vol. 83. 5th July 2012 pg. no. 817-830 and by D K Bhandari, G Nath, A B Ray, D V Tewari, published in Informa Healthcare, Vol. 38, No.4, 2000, pg. 254- 257). They revealed the antimicrobial activity of *Berberies aristata.* Another study of *Shodhana* and *Ropana* effect of certain Ayurvedic drugs on *Dushtavrana* was conducted by Dr Choudhari A.R. 1991, Jamnagar and showed good result of *Shodhana Ropana dravyas*.

Clinical Trial were also conducted to assess the effect of the local application of *Daruharidra* + *Madhu* on *Dushtavrana* by Dr Kadam Rahul V. 2010, BVDUCOA, Pune, wherein results showed alleviation of symptoms of *Dushtavrana.*

Research by the CCRAS has proved the bactericidal activity of *Berberin* on the basis of lab analysis, documented in the Database on Medicinal plants used in *Ayurveda*, Vol. 1, pg. 121 CCRAS).

A previous randomized, clinical trial conducted by Dr. Kadam Rahul V. using a mixture of the above-said drugs *Daruharidra* + *Madhu* as a *Lepa* (a semi-solid medicament used for external application) in the ratio of 1:2 showed significant alleviation. *Srava* (exudation, discharge), *Varna* (colour*), Gandha* (smell)*, Ushma* (local temperature)*, Araktata* (redness) and *Vedana* (pain) within the stipulated time period of the study. **This study established the drug efficacy but did not specify the micro-organisms it counteracted. This instigated a detailed study involving culture sensitivity test to analyse specific drug action.**

Aims & Objectives

AIMS AND OBJECTIVES

Aim:

To evaluate *Shodhana* effect of *Daruharidra* combined with *Madhu* as a *Lepa* in *Dushtavrana* using Culture sensitivity test against micro-organisms.

Objectives:

1. *Procurement of standardized trial drugs and their utilization in clinical trials.*
2. To evaluate clinical efficacy of the Daruharidra and Madhu in patients of Dushtavrana.
3. To identify the specific action of the trial drug against various micro- organisms.

Disease Review

DISEASE REVIEW - *AYURVED*

HISTORICAL REVIEW:

History is a coherent account of the significant events of the past. It throws light on the development and evolution of mankind. It helps to reveal hidden facts and ideas of any subject.

A large number of references pertaining to the *Vrana*, its *Shodhana* and *Ropana* along with its types are found in ancient Indian literature.

This literature is mainly divided into - Ancient, Medieval and Modern periods.

ANCIENT PERIOD:

Ayurved originated in the ancient period itself. *Brahma* is considered as the profounder of *Ayurved.* In the *Ayurved Avatarana* it is stated that, *Brahma* memorized *Ayurved* and told it to *Daksha Prajapati*. In that period, *Shiva* was said to be the physician of the celestial beings.

MEDIEVAL PERIOD:

This is further divisible in to: A) Period of the *Vedas*

B) Period of the *Samhitas*

A) PERIOD OF THE *VEDAS*:

This denotes the period between 1500 BC - 600 BC, Rigved and Atharvaved are the chief sources of medical information of this period. Various references on Vrana, available in these are mentioned below.

1) *RIGVED*:

In *Rigved, Rudra* is considered as the *Vaidya* and we find a verse addressed to God *Rudra,* 'I hear thou art the best of physicians'. He is also described as 'The depositary of all sciences' and 'The possessor of healing medicines.' *Ashwini Kumaras* are also considered as one of the most important physicians in *Rigved* and are called the *'Deva Vaidya'*. Various

references related to their works are available. For example, when *Vishpala's* (the daughter of king Khela) leg was severed in battle, the *Ashwini Kumaras* substituted an metal leg instead. This incident depicts the development of surgical procedures related to wound.

2) *ATHARVAVED:*

Ayurved is considered as the *Upaved* of *Atharvaved.* Various references regarding *Vrana* and *Vrana Shodhana - Ropana* are available in *Atharvaved.* The *Vrana Chikitsa* has been dealt in detail in its 2nd *Paada.* Some of the references are as follows;

In case of *Sadyo Vrana* produced due to *Abhighata* etc. *Sheeta Jaladhara* (sprinkling of cold water) is recommended for stoppage of blood, whereas in *Sadyo Vrana* caused due to weapon etc. *Laksha* is mentioned as *Vrana Ropaka.*

'Rohini Aushadhi' has also been mentioned in case of *Kshata Vrana* a variety of *'durva'* is also considered as one of the best drug for the stoppage of blood.

Salt is mentioned for the ripening of *apaki* (unripe) *Vrana.*

B) PERIOD OF THE *SAMHITAS*:

Ayurved developed to a great extent in this period. In the *Puranas, Upanishad, Smriti* etc. plenty of references regarding *Vrana* are available, *Sushrut Samhita* and *Charak Samhita* are the chief sources of *Ayurved* in the *Samhita* period. A few of them have been quoted below.

Various references regarding *Vrana Shodhana, Ropana* and *Vrana Chikitsa* are mentioned in the *Udyog Parva* and the *Bheeshma Parva* and even during the time of *Kurukshetra Yuddha* in the *Mahabharat.*

For example, when *Bheeshma* was on the *Sharashayya, Duryodhan* sent a *Vaidya* for the treatment of his wounds, but *Bheesha* refused and sent him back.

During the incidence of *Shishupala Vadha*, the *Lakshana* and complication of *Vrana* were explained. *Sadyo Vrana* showed pain and haemorrhage, sometimes resulting in shock and unconsciousness.

Brihataranyaka Upanishad too mentions healing of wound naturally or with the help of medicines.

C) *MAURYA KALA*:

In the *Kautilya Arthashastra* and in *Mudrarakshasa* some of the treatment regarding Vrana has been mentioned.

In wounds produced in the battle field, bandages were used to cover them.

D) *HARSHA CHARITA*:

Some of the references are as follows;

a) The bandage was made generally of the cotton cloth, but in emergency fine barks of trees were also used to cover the wounds.
b) The wound having a wide mouth and irregular shape is called as *Vrana Vidara* (lacerated wounds).
c) The haemorrhage in the wounds of the area of *Hrudaya* was difficult to stop.
d) *Sadyo Vrana* was associated with pain and haemorrhage.

E) *JATAKAMALA*:

It also contains various references regarding *Vrana*. Some of them are as follows;

a) Ulcers are caused after breaking of pustules or vesicles (Vrana Shopha).
b) The contact of the salt with the wound becomes painful.
c) Sometimes ulcers are associated with Kandu and it is considered as *Sukhabhimana*.

d) *Dushtavrana* full of *Pooya* is painful and is carefully opened and drained.
e) *Vrana Shodhana* and *Ropana* occurs with the help of medicines like *Ingudi Taila, Ghruta* etc.

F) *KADAMBARI*:

Some of the references regarding *Vrana* from *Kadambari* are as follows;

a) Arrows were a common weapon for causing injury in the battles and surgeons had to treat the wounds caused by them.
b) Arrows were dipped in poison to make them more potent. By this the contamination of wound occurred, delayed healing and also became life threatening.
c) Wounds caused by injury were sometimes severe thus producing disabilities in the organs.
d) Constant friction was considered as one of the cause for wound.

G) *KALIDASA*:

He mentioned Vrana in his various *Krutis*. Some of them are;

a) After the wound healed a scar remained.
b) Use of arrows after contamination with poison is mentioned.
c) *Sadyovrana* was associated with *Vedana* and *Raktasrava.*

H) *CHARAK SAMHITA*:

Charak described *Vrana* and its management in detail in the *Dvivraneeya Adhyaya* in the *Chikitsasthana.* It includes the varieties of *Vrana*, their *Lakshana* and *Vrana Srava, Vrana Gandha, Chikitsa* etc.

I) *BHELA SAMHITA*:

Like *Charak*, the management of Vrana was explained by *Bhela* in the *Chikitsasthana*. Various formulations were explained by him. For example, *Vrana Ropana Taila* with *Dhataki, Lodhra, Samanga, Madhuka* etc, *Vrana*

Shodhana Kashaya of the *Ksheerivruksha*, *Vrana Ropana Churna* with *Triphala, Madhuka, Lodhra* etc.

J) *SUSHRUT SAMHITA*:

Detail review of *Vrana* and its management has been discussed by *Sushrut*. During this time, the knowledge of wound had reached its peak. Being a good surgeon *Ahcarya Sushrut* knew the importance of wound in practice.

In the whole *Sutrasthana,* he explained *Vrana*, its aetiology, its *Lakshana*, the *Vranitagara*, the method of *Vrana-Rakshana Vidhi*, the various types of *Vranasrava, Dushtavrana* and *Shuddhavrana* in detail.

In the *Chikitsasthana* he explained about the treatment and the varieties of *Dushtavrana* etc.

K) *KASHYAP SAMHITA:*

In *Kashyap Samhita*, the description of *Vrana* is in the *Dvivraneeya Chikitsa*. He explained *Vrana* in this chapter, for the benefit of treatment of children. He explained *Dvivrana* as *Nija* and *Agantuj* and again classified them into subvarieties.

L) *ASHTANG SANGRAH*:

The *Vrana* and its management were explained in detail by *Vagbhat*. He explained *Triphala* as *Vranaropana* and *Vrana Shodhana*.

In the *Uttarasthana* he gave details about *Vrana, Vrana Chikitsa* and *Sadyovrana* in the 29th, 30th and 31st chapter.

M) *ASHTANG HRUDAYA:*

Acharya Vagbhat` described types of *Vrana* and its management in *Ashtang Hrudaya* too. The explanations are almost similar to those in *Ashtang Sangrah*.

He mentioned *Triphala* as *Vrana Ropana, Shodhana* and as *Srava Hara*.

N) *BHAISHAJYA RATNAVALI*:

In *Vranashotha Chikitsa Adhyaya,* various *Vrana Ropana Lepa, Vrana Shodhana Kashaya, Raktamokshana* etc. have been explained. A separate chapter was present for *Sadyovrana Chikitsa*. A description of *Triphala Guggulu* was quoted in *Vrana Shotha Chikitsa Adhyaya*.

O) *MADHAV NIDAN*:

The type, character and classification of *Vrana* were described in chapter 41 and *Agantuja Vrana* (*Sadyovrana*) in chapter 42 in this text. His explanations are almost similar to those of *Sushrut*.

P) *SHARANGADHAR SAMHITA:*

Sharangadhar classified *Vrana* mainly into four groups viz. *Agantu, Dehaja, Shuddha* and *Dushta* and further on into fifteen subtypes.

He also explained various medicines for the treatment of *Vrana.*

Q) *BHAVAPRAKASH*:

A complete chapter is devoted to *Vrana, Vrana-Shotha, Vrana Shodhana* and *Vrana Ropana*. Uses of different drugs, particularly in healing are also discussed.

Ayurved has been practiced in this country from time immemorial and has stood the test of time. The study of *Shalyatantra* brings out very clearly, that *Vrana* is the most significant entity on which the whole science of surgery revolves. The *Ayurved* classics at various places have emphasized on methods to take care of *Vrana* which occur either as a result of *Doshadushti* or due to *aghata* (trauma). The plan for the management of *Vrana* is divided under three sub-headings….

(1) *Purva karma*

(2) Pradhana karma

(3) Paschata karma

Besides this, different measures like local and general medications as well as proper diet, appropriate management at the proper time is essential to avoid the conversion of *Sadhya* to *Asadhya Vrana*.

Twacha:

According to *Ayurved, twak* is considered as '*Sparshanendriya*' and is sense organs of 'Sparsha' i.e. touch. It is '*Panchbhautik*' in nature but has a predominance of *'Vayu' tatwa*.

- त्वचो वायु: .... अधिदैवतम्।

The skin is the '*daivat*' (*deity*) of *'Vayu' tatwa*.

- वायव्यास्तु स्पर्श: स्पर्शनेन्द्रियम्।

Though skin is *Panchabhautik* in constitution, it shows a prevalence of *Vata Dosha*

- त्वक्....मातृजानि। ३.....६

Twacha is mainly a *'Matruja'* organ i.e. mainly formed from *'Shonita'* from mother.

- तृतीये मासि सर्वेन्द्रियाणि सर्वांगावयवाश्च यौगपद्येनाभिनिर्वन्तन्ते॥ सु. शा. ३/११

According to *Sushrutacharya twak* is formed in the third month of intrauterine life.

- षष्ठे स्नायुसिरारोमबलवर्णनखत्वचाम् ॥ वा.शा.१/५७

Vagbhatacharya however says that *twak* is formed in the 6th month of intrauterine life.

The 4 *prakrit* colours of the *twak* are described as,

- तद्यथा कृष्ण: श्याम: श्यामावदात: अवदातश्चेति प्रकृतीवर्ण: शरीरस्य भवन्ति॥ च.. १/८
  अवदातो गौर: । चक्र
- वेदनानामधिष्ठानं मनोदेहश्च सेन्द्रिय : ।

केशलोमनखागात्रमलदवगुणैर्विणना ॥ च. शा. १/१३६

Thus, it is clearly mentioned that the tip of hairs are devoid of sensory innervations.

- **FORMATION :**

1. *Vagbhatacharya:* ⟶ during formation of blood.
2. *Charakacharya:*⟶ during formation of all *Dhatus* in the third month from the *Shukra-Shonita.*

- **LAYERS OF THE SKIN :**

Charakacharya has described 6 layers of *twacha* as follows:

शारीरे षट् त्वच: तद्यथा उदकधरा त्वग्बाह्या द्वितीया असृगधरा ततीया सिध्मकिलाससंभवाधिष्ठाना चतुर्थी ददुकुष्ठसंभवाधिष्ठाना पंचमी त्वलजीविद्रधिसंभवाधिष्ठाना षष्ठी तु यस्यां छिन्नायां ताम्यति इव च तम: प्रविशति यां वाधिष्ठायारुंषी जायन्ते पर्वसु स्थूलमूलानि दुश्चिकित्स्यतमानि च ॥

च. शा. ७/४

However, *Sushruta* describes the following 7 layers of *twacha.*

तस्य खलु एवं प्रवृतस्य शुकशोणितस्य अभिपच्यमानस्य क्षीरस्येव सन्तानिका: सप्तत्वचो भवन्ति। तासां प्रथमा अवभासिनी नाम या सर्वान् वर्णान् अवभासयन्ति पंचविधाम् च छायां प्रकाशयति सा व्रीहेरष्टादशभागप्रमाणा सिध्मपद्मकंटकाधिष्ठाना। द्वितीया लोहिता नाम षोडशभागप्रमाणा तिलकालकन्यच्छव्यंगाधिष्ठाना। तृतीया श्वेता नाम द्वादशभागप्रमाणा चर्म दलअजगल्लीमषकाधिष्ठाना। चतुर्थी ताम्रा नाम अष्टभागप्रमाणा विविधकिलासकुष्ठाधिष्ठाना। पंचमी वेदिनी नाम पंचभागप्रमाणा कुष्ठविसर्पाधिष्ठाना। षष्ठी रोहिणी नाम व्रीहीप्रमाणा ग्रन्थ्यपच्यर्बुदश्लीपदगलगण्डाधिष्ठाना। सप्तमी मांसधरा नाम ब्रीहिद्वयप्रमाणा भगन्दरविद्रधिअर्शोऽधिष्ठाना।

सु.शा. ४/४

Sr.No.	Name of Layer	Depth
1	*Avabhasini*	1/18th Vrihi
2	*Lohita*	1/16th Vrihi
3	*Shweta*	1/12th Vrihi
4	*Tamra*	1/8th Vrihi
5	*Vedini*	1/6th Vrihi
6	*Rohini*	1 Vrihi
7	*Mansadhara*	2 Vrihi

- ***Sharirkriya* (Physiology):**

The physiology of the body is mainly governed by the *Doshas*, *Dhatus*, and *Malas.* The skin retains water and keeps itself moist. Thus it has a relation with the water-content and sweat as described by *Charakacharya* in the *Sharir sthana.*

The skin is responsible for the absorption of sneha and external medicaments. Presence of *Sweda* is essential for maintaining the healthy skin. It has a relation to *Majja dhatu*, because *Mala* of *majja* is *twaksneha.*

In *Kashyap samhita, Kashyap* mentions the presence of 2 lakh *romakupas* and every *romakupa* contains one *Sukshma sira*, which carries *Sweda* to the exterior.

साग्रे शतसहस्रे द्वे बहिर्अंतश्च कूपका : ।

प्रस्विद्य मानसै: स्वेदम् विमुच्यति सिरामुखै:॥

पक्वाशयकटिसक्थिश्रोत्रास्थिस्पर्शनेन्द्रियम्।

स्थानं वातस्य .....॥ का.सं.१२/१

नाभिरामाशयस्वेदोलसिकारुधिरं रस : ।

दृक स्पर्शनं च पित्तस्य ..... ॥ का.सं.१२/२

त्वकस्थं भ्राजकं भ्राजनात्वच: ..... ॥ का.सं.१२/१४

शाखारक्तादयस्त्वक् च बाह्यरोगायनं च तत् ॥ का.सं.१२/४४

मांसाद् वसा त्वचा षट् च । च.सं.

Thus, skin is the prime site for *Vata Pitta Doshas, Primarilu*; the *Bhrajaka Pitta* is closely associated with the skin. The skin forms the '*Bahya Rogamarga'*. New skin is daily formed as a by-product of the *'Mamsa' Dhatu*.

Vata Dosha if increased gives *Krishna Pitta Dosha* gives *Peeta* (yellowish) and *Kapha Dosha* gives *Shweta* (whitish) discolouration to the skin.

VRANA

Acharya Sushrut, the father of surgery has explained *Vrana* in detail with its derivation, synonyms, definition, classification, *lakshana, sadhya-asadhyata, nidana, chikitsa and upadrava* etc.

***UTPATTI*:**

The word *'Vrana'* is derived from the word ***Vra-Vranoti*** meaning – to cover, to envelope and to protect. This is further suffixed by "ach" in the sense of *Bhava* and "Ch" sound is elided and the form remains "*Vran" + "a"*.

***NIRUKTI*:**

a) व्रण गात्रविचूर्णने व्रणयति इति व्रण । सु.चि.१/६

Destruction or damage of the tissue of body part is termed as *Vrana*.

b) वृणोति आच्छादयति। डल्हण सु. सू. २१/४०

There is scar formation after healing the *Vrana*

c) व्रणयति गत् तुं विवर्णा वैवर्ण्य करोति इति व्रण:। डल्हण सु.चि.१/६

There is discoloration at the site of Vrana after healing.

d) सवृणोति आच्छादयति यस्मात् तस्मात् व्रण इति अथवा व्रणवस्तु व्रणचिन्हं रुढेऽपि न नश्यति तथैवास्ते आदेहधारणात् तस्मात् व्रण इति।

डल्हण .

Vrana never vanishes even after its complete *Ropana* because once a breach in the continuity of the skin occurs, it remains forever either in the form of a scar tissue or a discoloured, depigmented mark and its original, natural anatomy can never be restored by any means.

DEFINITION:

व्रण गात्रविचूर्णने व्रणयति इति व्रण ।

सु. सू. १/६

"The destruction/break/rupture/discontinuity of body tissue/part of body is called ***Vrana."***

In the *Sutrasthana* Chapter 21, *Sushrut* has clarified that "As the scars of a wound never disappear even after complete healing and its imprint persists lifelong, it (the lesion) is called ***'Vrana'*** by the wise".

वृणोति यस्मादरूढेऽपि व्रणवस्तु न नश्यति ।
आदेहधारणात् तस्मात् व्रण इत्युच्यते बुधैः॥

Su.Su. 21 /40

Vrana is defined on the basis of both its initial effects and its resultant scar. It is a condition which consumes the tissue and after healing leaves behind a scar throughout the life of the individual.

Vrana are not limited only to the skin. They affect muscles, blood vessels, ligaments, bones, joints, viscera and other vital parts as well.

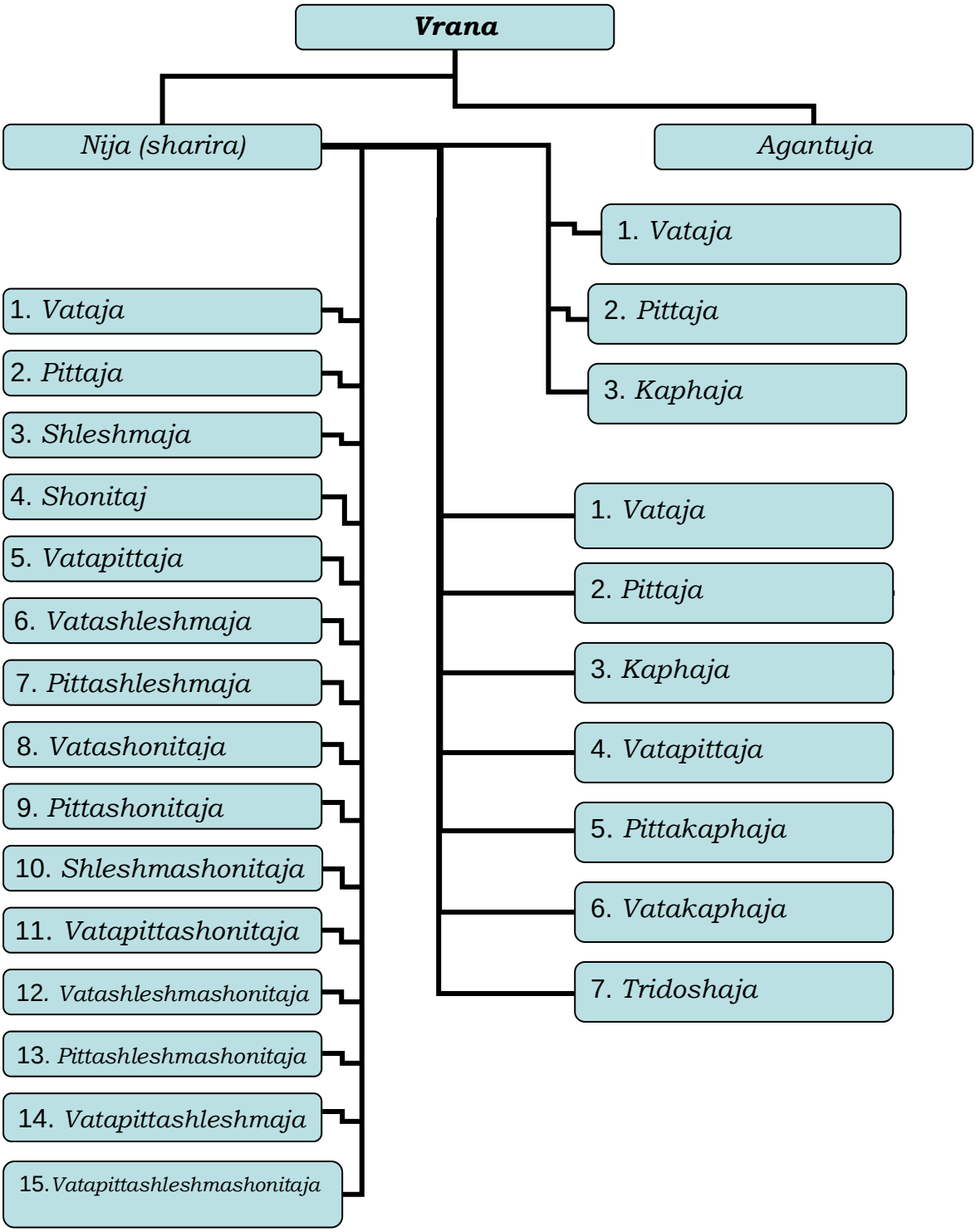
VERNACULAR NAMES/ SYNONYMS:

'Vrana' according to different languages is also named as:–

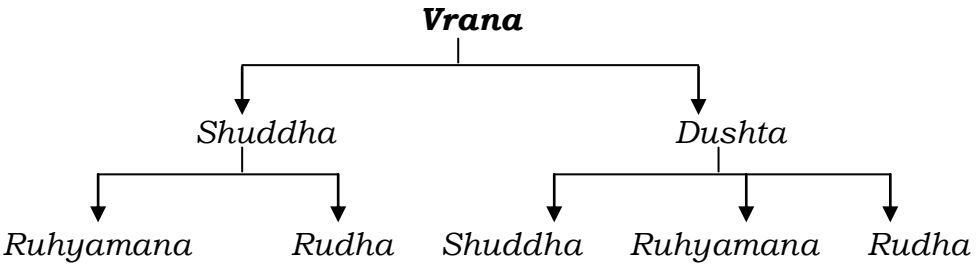
Sanskrit	:	*Aru, Kshatma, Kshati, Parikshata, Vrana, Twakbheda, Viccheda.*
English	:	Ulcer, Wound, Injury
Kannada	:	*Gaaya, Hunnu*
Telugu	:	*Pandu, Gaayamu*
Malayalam	:	*Murivu, Vranam*
Tamil	:	*Punnu, Adi*
Hindi	:	*Zakhm, Ghav, Chot*
Marathi	:	*Jhakham, Iza, Vrana*

CLASSIFICATION:

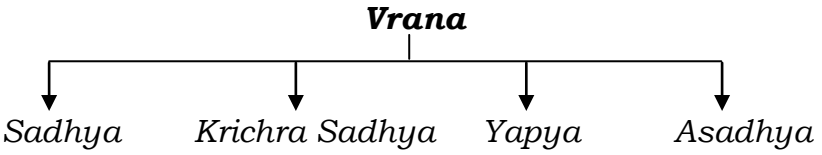
I) According to *Hetu-bheda* / Etiology :



II) According to *Awastha-bheda* / Clinical Features :



III) According to *Sadhya- Asadhyata* / Prognosis :



IV) According to *Nanatva-bheda (Charak) :*

कृत्य अकृत्य दुष्ट अदुष्ट संवृत निवृत दारुण मृदु स्रावी नि: स्रावी सविष निविष समस्थित विषमस्थित उत्संगी अनुत्संगी उत्सन्न अनुत्सन्न मर्मस्थ अमर्मस्थ ॥

च. चि. २५/२१-२२.

Kritya - Utkritya *Dushta – Adushta* *Marmashrita - Amarmashrita*
Samvruta -Vivritta *Daruna - Mridu* *Sravi - Asravi*
Savisha – Nirvisha *Vishamasthita - Samasthita* *Utsangi - Anutsangi*
Utsanna - Anutsanna

***Agantuja Vrana* (Accidental / Traumatic wound):**

These are also subdivided into various types:

- **According to *Acharya Sushrut* : 6 sub- types**

छिन्नं भिन्नं तथा विध्दं क्षतं पिच्चितमेव च।
घृष्टमाहुस्तथा षष्ठं ..... ॥

सु.चि. २/९

Chinna *Bhinna*
Viddha *Kshata*

Picchita *Ghrishta*

- **According to *Ashtanga Hridaya* : 7 sub- types**

  घृष्टावकृत्तविच्छिन्नपविलंबितपातितम्।

  विध्दं भिन्न विदलितम् ..... ॥

  वा. ऊ. २६

- **According to *Ashtanga Sangraha* : 3 sub- types**

  Chinna → *Ghrista, Avakrita, Vicchinna, Vilambita, Patita.*

  Viddha → *Anubhinna, Bhinnatundita, Atibhinna, Nirahinna, Anuviddha, Nirbhinna Atividdha, Nirviddha*

  Picchita → *Savrana, Avrana*

- **According to *Sharangadhar Samhita* : 8 sub- types**

Chinna	*Bhinna*
Viddha	*Vilambita*
Avikalpita	*Ghrista*
Nipatita	*Prachalita*

1. *Dushtavrana* :

दोषै: अधिष्ठितो दुष्ट: ।

Vrana having doshaja involvement is *Dushtavrana. Nija Vrana* from the beginning is in this *awastha* i.e. shows signs and symptoms of *Doshadushti. Agantu Vrana,* though initially *Shuddha*, gets transformed into this *awastha* after *Doshadushti.*

तत्राऽतिसंवृतोऽतिविवृतोऽतिकठिनोऽतिमृदुरुत्सन्नोऽवसन्नोऽतिशीतऽत्युष्ण:कृष्णरक्तपीतशुक्लादीनां

वर्णानामन्यतमोवर्णो भैरव: पूतिपूयमांससिरास्नायुप्रभृतिभि: पूर्ण:

पुतिपूयास्रावी उन्मार्ग्युत्सङ्ग्यमनोज्ञदर्शनगन्धोऽत्यर्थ वेदनावान् दाहपाकरागकण्डूशोफपिडकोपदुतमत्यर्थ

दुष्टशोणितास्रावी दीर्घकालानुबन्धी चेति दुष्टव्रणलिङ्गानि ॥ ७

श्वेतोऽवसन्नवर्त्माऽतिस्थूलवर्त्माऽतिपिञ्जर: ।

नील: श्यावोऽतिपिडको रक्त: कृष्णोऽतिपूतिक: ॥

रोप्य: कुम्भीमुखश्चेति प्रदुष्टा द्वादश व्रणा: ।

चतुर्विंशतिरुधिरष्टा दोषा: कल्पान्तरेण वै ॥ च. सू. २०/२४

Dushtavrana shows signs and symptoms of the concerned *Dosha* and is named accordingly e.g. *Vataja Vrana, Pittaja Vrana* etc.

In addition to *Doshaja* features, many types of *Vrana, Gandha, Srava, and Vedana* are described in case of *Dushtavrana.*

पूतिगन्धान् विवर्ण्यश्च बहुस्रावा महारुज: ।

व्रणानशुध्दान् विज्ञाय: शोधनै: समुपाचरेत् ॥

च. चि. २५/८३

Vangasen in his *Chikitsa Sarsangraha* describes *Dushtavrana* as follows:

पूतिपूयातिदुष्टासृक् स्राव्युत्संगी चिरस्थिति : ।

दुष्टोव्रणिति विज्ञेय : शुध्दलिंगविपर्ययै : ॥

This means, in *Dushtavrana* there is,

1. Presence of *Doshadusht..*
2. Presence of *vividha* and *prabhut Srava.*
3. Discolouration of the skin.
4. Foul smelling discharge.
5. Inflammation.
6. Destruction of *Dhatus.*
7. *Chirakaritwa.*

2. *Shuddhavrana* :

Dalhana defines *Shuddhavrana* as,

सकलदोषोपप्लवरहित शुध्दत्त्वम् । डल्हण

Vrana devoid of signs and symptoms of *Dushta Doshas* is called as *Shuddhavrana.*

This includes following three types of *Vranas.*

1. *Vaidyakruta* – surgical incisions over the 'prepared' skin.

2. *Agantu Vrana* of recent origin.
3. *Dushtavrana* after proper *Shodhana chikitsa*.

Shuddhavrana may show signs and symptoms of *Prakrut Doshas* and therefore there may be slight pain.

Thus features of *Shuddhavrana*[6] are

1. *Akruti* - *'Suvyavasthito'* i.e. of regular size and shape.
2. *Vedana* - It shows complete absence of doshaja pain but may show alpa *vedana* due to *Prakrit Vata Dosha*. In case of *Agantu Vrana*, pain is much severe due to *Vata* prakopa caused by *Abhighata.*
3. *Srava* - It is '*nirasrava*' i.e. doesn't show any discharge, but it may show serous discharge which is very less in quantity. In *Agantu Vrana* there is *Rakta srava*.
4. *Vranatala* - *Sama* i.e. the base is not *unnata* or *avanata*.
5. *Sparsha* - *Mrudu* and *Snigdha.*
6. *Varna* - *Jivhatalabha* i.e. pinkish, like tongue.
7. *Vranoshtha* - *Shyav* (blackish white)
8. Presence of '*pitika*' due to granulation tissue.
9. *Anupadrava* - Does not show any complications.
10. *Saranbharahitatwa* - no redness / inflammation.
11. *Doshopaplavarahitatwa* - absence of *Doshadushti.*

8. *NIDANA* OF *VRANA*:

It resembles the nidana of *Doshadushti* –

Nidana* of *Vrana

Dosha	***Aahara***	***Vihara***
Vata	*Vataprakopaka Aahara* i.e. *Laghu, Katu, Lavana Aahara, Shushkashaka* etc.	*Balavat Vigraha, Atiyoga of Vamana,Virechana, Raktamokshana, Vyayama and Dharana of Adharaneeya Vega or Gaja-Ratha Padaaticharya* etc.
Pitta/ Rakta	*Pittaprakopaka aahara* i.e. *Ushna, Amla, Lavana, Katu, Kshara, Teekshna, Laghu, Vidahi, Tila Taila, Pinyaka*	*Krodha, Shoka, Bhaya, Aayasa, Upavasa, Maithuna* etc.
Kapha	*Kaphaprakopaka aahara* i.e. *Guru, Madhura, Pichchila, Sheeta, Lavana, Masha-Mahamasha*	*Divaswapna, Avyayama, Aalasya etc.*

SAMPRAPTI:

Vata, Pitta and *Kapha dushti* occurs due to their respective causes and get located in the external passage (*Bahirmarga Samashrita*) and thus produce *Nija* (innate) *Vrana* eg. *Madhumehaja Vrana, Kushtaja Vrana.*

PATHOGENESIS OF *VRANA*:

The doshas, the basic physiological forces, when imbalanced lead to the pathogenesis of disease.

This process occurs in a definite, sequential form which *Sushrut* classifies as the six *Kriyakalas* (stages of pathogenesis). On the basis of

these, the stage of disease, the treatment and its prognosis can be very well understood. They are as follows:

- ***Chaya*:** Cumulation or intensification of *Dosha karya* at a site.
- ***Prakopa*:** Imbalance or de-organisation of the *Dosha karya* at a site.
- ***Prasara*:** Spread of *Dushta Dosha* along the circulatory system.
- ***Sthanasamshraya*:** Manifestation of various pathophysiological forces at various sites or organs resulting in the early functional imbalance of the organs.
- ***Vyakti***: Definite and demonstrable clinical manifestations of disease, generally

Vrana Sopha, Vidradhi, Granthi, etc. occur in the fifth *Kriyakala* stage and thus it happens to be pre-state of the *Vrana*.

Thus, swelling that occurs prior to *Vrana* formation is called *Vrana Shotha.* After undergoing three different stages viz *Amawastha*, *Pachyamanawastha* and *Pakvawastha* it manifests itself as *Vrana*. These stages are characterized by different but specific symptoms as a result of *Doshadushti*.

Vayu is responsible for the symptoms of pain, suppuration can not set in without *Pitta* and the *Dushit Kapha* is responsible for production of pus in *Shotha.*

The onset-duration-progress of the *Vrana* depends on the dominant *Doshas* involved. If the dominant dosha in the 5th *Kriyakala* is *Kapha*, the change into the 6th *Kriyakala* is prolonged while if Pitta is the dominant *Dosha,* the change into the 6th *Kriyakala* is quick.

- ***Bheda*:** This is the stage of complication where, if *Vrana* is not treated, may lead to subacute or chronic stage and may gradually become incurable due to extensive damage of the tissue.

***VRANA AWASTHA* (STAGES):**

There are total four stages of *Vrana*

1. *Dushta Awastha.*
3. *Ruhyaman Awastha.*

2. *Shuddha Awastha.* 4. *Rudha Awastha.*

These *awasthas* sequentially progress towards wound healing.

1) *DUSHTA AWASTHA:*

पूतिगन्ध : विवर्ण्यश्च बहुस्राव : महारुज : ।

व्रणानशुध्दान् विज्ञाय: शोधनै : समुपाचरेत् ॥

च. चि. २५/८३

This is the first stage of *Nija Vrana* and second stage of *Agantu Vrana* and is characterized by :-

- *Doshadushti.*
- Destruction of *Dhatus.*
- Presence of *Dushta Srava.*
- Presence of *Dushta Rakta.*
- Presence of *Vedana* according to *Doshadushti.*
- After proper *Shodhana Chikitsa* it progresses into the next stage i.e. *Shuddha Awastha.*

2) *SHUDDHA AWASTHA*:

त्रिभिर्दोषैरनाकान्त : श्यावौष्ठ : पीडकी सम : ।

अवेदनो निरास्रावो व्रण: शुध्द इहोच्यते ॥ सु. सू. २३/१८

श्यावौष्ठ इति किचित्कृष्णपाण्डु: प्रसीदच्छोणितत्वात् अन्ये श्यावौष्ठता कषायपरिषेकाभ्यङ्गादिकृता वदन्ति ।

पीडका व्रणौष्ठेऽणुमांसाकुरा: । अवेदन इति न विद्यते वातादिनां तोदादिवेदना यस्य स अवेदन:

सामान्यशुध्दव्रणवेदना तु विद्यत एव ॥ डल्हण

In this stage, there is equilibrium of *Doshas* and therefore absence of any sign or symptom of *Doshas*. The features are-

- *Vrana* has a bluish margin.
- Presence of *Pidaka* i.e. granulation tissue at the base of *Vrana.*
- Absence of pain or mild pain.

- Absence of *Srava* or a little *Srava.*

This is the proper stage of *Ropana Chikitsa*, to maintain the *Doshaja* equilibrium and achieve *Dhatu Vruddhi.*

3) *RUHYAMANA AWASTHA:*

कपातवर्णप्रतिमा यस्यान्ता: क्लेदवर्जिता: ।

स्थिराश्चिपिटिकावन्तो रोहतीति तमादिशेत् ॥ सु. सू. २३/१९

चिपिटिकावन्त इति चर्मचेलीयुक्ता विशुष्यमाणत्वात्वचश्चर्मचेलीसंभव: ।

व्रणेशुष्कसूक्ष्मश्वेता या उच्चटति त्वक् सा चर्मचेली इति कथ्यते ।

This is the stage of repair. '*Ruha*' is the root for the word *ruhyaman* which means 'to grow'. Thus, this is the healing stage.

Features:

- *Kapot Varna* i.e. grey colour like pigeon
- *Anta-kledavarjita* – margins of the *Vrana* are dry. Absence of mucopurulent discharge or *'kleda.'*
- *Anta-sthira* – *Vrana* margins are firm with granulation tissue.
- *Chipitikayukta* – surrounded by shreds of epithelium.

4) *RUDHA AWASTHA*:

रुढवर्त्मानमग्रन्थिमशूनमरुजं व्रणम् ।

त्वक्सवर्ण समतलं सम्यगूढ विनिर्दिशेत् ॥ सु. सू. २३/२०

रुढवर्त्मानं रुढमार्ग रुढवर्णवस्त्वित्यर्थ : ।

This is the last stage of wound healing. It shows following features.

- *Rudhavartmanam* → closure or complete healing by approximation or opposition of wound margins
- *Agranthi* → no hypergranulation/ glandular mass/ induration.

- *Ashunam* → absence of any swelling.
- *Arujam* → absence of any pain.
- *Twak-savarna* → having same colour of the skin.
- *Samatalam* → at the same level of the skin.

FACTORS DELAYING WOUND HEALING:

स्नायुक्लेदात् सिराक्लेदात् गांभीर्यात् कृमीभक्षणात्।

अस्थिभेदात् सशल्यत्वात् सविषत्वाच्च सर्पणात् ॥

नखकाष्ठप्रभेदाच्च चर्मलोमातिघट्टनात्।

मिथ्याबन्धादतिस्नेहात् अतिभैषज्यकर्षणात्।

अजीर्णादतिभुक्ताच्च विरुध्दासात्म्यभोजनात्।

शोकात्क्रोधाद्दिवास्वप्नाद्व्यायामान्मैथुनात्तथा।

व्रणा न प्रशमं यान्ति निष्क्रियत्वाच्च देहिनाम्॥

च. चि. २५ - ३१/३४

a. *Aahara – Atiahaar, Anashana, Viruddhashana, Asatmya Aahara.*
b. *Vihara – Vyayama, Divaswaap, Atimaithuna.*
c. *Dharaniya Vega – Krodha, Bhaya, Lobha, Harsha, Shoka*
d. *Vrana Adhisthana – Asthi Bheda, Nakha Kashtha Prabheda, Charmaloma.*
e. Structural Form of *Vrana – Snayukleda, Seerakleda, Gambhirya, Savishatwa, Sarpana, Kumbhimukha, Agantuja, Sashalyatva, Atisneha.*
f. Other Factors – *Atibhaishjya Prayoga, Mithya Yoga, Mithya Bandhan,*

Atighattana, Madhumeha, Kushtha, Shosha.

***UPADRAVAS OF VRANA* – (COMPLICATIONS):**

Sushrut has described following *Upadravas* of *Vrana* as follows:

उपद्रवास्तु विविधा व्रणस्य व्रणितस्य च ।

तत्र गन्धादय: पञ्च व्रणस्योपद्रवा: स्मृता: ॥

ज्वरातिसारौ मूर्च्छा च हिक्का च्छर्दिररोचका: ।

श्वासकासाविपाकाश्च तृष्णा व्रणितस्य तु । सु. चि. १/१३८,१३९

1) *Upadrava* of *Vrana* includes: *'Pancha Lakshana'*

i) *Gandha* (odour) ii) *Varna* (colour)

iii) *Srava* (discharge) iv) *Vedana* (pain)

v) *Akruti* i.e. (shape)

2) *Upadrava* to *vranita* are ten and as follows:

i) *Jwara* *ii)* *Atisara*

iii) *Murchcha* *iv)* *Hikka*

v) *Chhardi* *vi)* *Arochaka*

vii) *Shwasa* *viii)* *Kasa*

ix) *Avipaka* *x)* *Trushna*

Charakacharya has described the following 16 *Upadravas*

विसर्प: पक्षाघातश्च सिरास्तंभाऽपतानक: ।

मोहोन्माद व्रणरुजो ज्वरस्तृष्णाहनुग्रह: ॥

कासच्छर्दिरतीसारो हिक्का श्वास: सवेपथु: ।

षोडशोपद्रवा: प्रोक्ता व्रणानां व्रणचिन्तकै: ॥

च. चि. २५/२९,३०

Visarpa *Pakshaghata*
Sirastambha *Apatanaka*
Moha *Unmaad*
Vranaruja *Jwara*

Trishna	*Hanugraha*
Kasa	*Chhardi*
Atisar	*Hikka*
Shwasa	*Vepathu.*

Vangasena has also described 16 *Upadravas* like *Charakacharya* but he mentions '*Sheerastambha*' in place of '*Sirastambha.*'
In addition, he mentions the major *Vrana Upadrava* '***VRANAYAM***'.

मर्मस्थितं व्रणं प्रपत्य हि अनिल : सर्वदेहग : ।

वेगै : आयम्यते देहम् व्रणायामं तु त्यजेत् ॥ भा . नि .

Bhavaprakasha and *Vangasena* mention another *Vrana upadrava* as "***Vranagranthi*".** In this the *Dushta Rakta* and *Vata* produce an indurated swelling at the place of *Vrana*, which has *Kandu* and *Daha* as its features.

***SADHYA-ASADHYATA*:**

- तत्र वय : स्थानां दृढानां प्राणव्रतां सत्त्ववतां च सुचिकित्स्या व्रणा : ।
- त्वङ्मांसजं सुखे देशे तरुणस्यानुपद्रव : ।

  धीमतोऽभिनव: काले सुखसाध्य : स्मृतो व्रण : ॥

  च. चि. २५/३६

1) *Sukhasadhya Vrana*:

a) According to *Vrana* ***akruti***

Ayata, Vrutta, Triputaka, Chaturasra are easily curable.

b) According to *Vrana* ***sthana*** **–** *Sphik, Payu, Lalat, Ganda, Oshtha Falakosha Udara* etc.

c) According to *Vrana* ***Vastu*** **–**

i. *Sushrut – Twak ashrita* (सु. सू. २२)

तत्र त्वग्भेदी व्रण : सूपचार : शेषा : दुरुपचारा : ॥ ४

ii. *Charak* ⟶ *Twak – Mamsa ashrita.*

d) According to patient⟶young, strong, having good *Agni,* strong will power.

e) *Vrana* of recent origin, having no complications.

f) According to *Kala* ⟶ *Hemant* and *Shishira Rutu.*

g) According to *Desha* ⟶ *Sadharan Desha.*

2) *Kricchra Sadhya Vrana*:

कुष्ठिनां विषजुष्टानां शोषिणाम मधुमेहिनाम् ।

व्रणा : कृच्छ्रण सिध्दयन्ति येषां चाऽपि व्रणे व्रणा : ॥ सु. सू. २३/ ७

Sthana	*Eyes, teeth, nailbed, nose, marma and joints.*
Vrana srava	*pus, blood, gas discharge*
Rugna	*Krisha, kushthi, dushi-visha-pidit.*
Sashalyata	*Vrana with multiple doshaja involvement and Vrana with 'Upadravas'.*

3) *Yapya Vrana:*

Yapya means the disease in which signs and symptoms are relieved till the treatment is being done.

Yapya Vrana

- Secondary to *avapatika*
- *Nirudha-prakasha* and *sanniruddha guda*
- *Krumiyukta Vrana* or secondary to skin disease
- Patient of abdominal disease like *krimi*
- patient of *sharkara, sikatameha, vatakundalika, ashthila*
- Patient of *dantasharkara, upakusha, visarpa*
- Patient of *urakshata, visarpa, asthikshata*
- With *Vranagranthi*

4) *Asadhya Vrana:*

१. असाध्य व्रण ... मांसपिंडवत् उद्गता: प्रसेकिनो ऽन्तपूयवेदनावन्तो अश्वापानवदुध्दतौष्ठा केचित् कठिना गोशृंगवत् उन्नतमृदुमांसप्ररोहा: अपरे दुष्टरुधिरास्राविण: तनुशीतपिच्छिला स्राविणो वा मध्योन्नता केचिदवसन्नशुषिरपर्यन्ता शणतूलवत् स्नायूजालवन्तो दुर्दर्शना वसामेदोमज्जामस्तुलंगस्राविणश्च दोषसमुत्था: ॥

कुङ्कुमध्यामकङ्कुष्ठसवर्णा: पित्तकोपत: ।

न दहयन्ते न चूष्यन्ते भिषक् तान् परिवर्जयेत् ॥

कण्डूमन्त: स्थिरा: श्वेता: स्निग्धा: कफनिमित्तत: ।

दूयन्ते वाऽपि दहयन्ते भिषक् तान् परिवर्जयेत् ॥

कृष्णास्तु ये तनुस्रावा वातजामर्मतापिन: ।

स्वल्पामपि न कुर्वन्ति रुजं तान् परिवर्जयेत् ॥ सु. सू. २३/१३,१४,१५

प्राणमांसक्षयश्वासकासारोचकपीडिता: ।

प्रवृध्दपूयरुधिरा व्रणा येषां च मर्मसु ॥ सु. सू. २८/२०

***Asadhya Vrana* are described by *Sushrut* as follows:**

A) According to *Vrana lakshana vishesha* -

1. *Vrana* everted like *mamsapinda.*
2. *Prasekina – Vrana* with profuse discharge.
3. *Vedanavanta* – having much pain.
4. *Kathina* – hard and producing processes of the *mrudu mamsa* like cow-horn.
5. *Dushta-rudhira Sravi, Tanu, Sheeta, Pitchchilasravi, Madhyonnata.*
6. Having minute openings at *Vrana* edges.
7. *Snayu-jalavanta.*
8. Looking very ugly.

B) According to Site of *Vrana:*

1. *Koshthastha Vrana* – discharging yellow, black urine, faeces and flatus.

2. *Shira-kanthastha Vrana* – from which gas is passing producing noise i.e. *'Sashabda Vata Vahinah'*.
3. *Kshina Mamsa Vranitsya Vrana* – discharging *Puya* and *Rakta*.

C) According to *Srava* of *Vrana*:

1. *Vrana* discharging *Vasa, Majja, Mastulunga, Meda.*
2. *Vrana* discharging *Dushta Rakta, Tanu, Pichila Srava.*

DUSHTAVRANA:

A *Vrana* which refuses to heal or heals very slowly due to any external or internal factors despite best efforts may be termed a *Dushtavrana*.

***HETU* / AETIOLOGY OF *DUSHTAVRANA*:**

A *Vrana* changes into *Dushtavrana* either due to *Dosha*dushti or due to improper treatment of *Doshaja* and *Agantuja Vrana*.

The aetiological factors described by *Charak* are:–

a) Presence of foreign bodies in wound:

Contaminated wound either from the outside or by the necrosed tissue of the wound and *Doshas* itself, along with the foreign body i.e. *Shalya* lying in the wound, like nails or wooden pieces, fractured bone, maggots, presence of toxins etc. generally lead to *Agantuja Vrana*, which when not treated properly changes into *Dushtavrana*.

b) Improper treatment of *Agantuja Vrana*:

These conditions occur when improper dressing is done. *Sushrut* mentions various causes of *Dushtavrana* as use of irritant substances, effect of various poisonous substances, faulty diet and habits. All the above factors delay the healing process by acting both locally on the wound tissue as well as systemically, resulting in *Doshadushti*.

c) The faulty habits of patient:

These factors also cause *Doshadushti* and damage to the healing tissue. Habits such as eating before the proper digestion of food, over eating,

intake of incompatible food items, unsuitable food, *Shoka, Krodha, Divaswaap*, physical exercise, primarily act on the *Tridoshas* causing the *Dushti* one or more of them, which in their turn act on the *Dhatu* or constituents of the body and produce the disease.

***Dushta Vrana Lakshana*:**

Sushrut	***Ashtang Hridaya***	***Charak***	***Ashtang Sangraha***	***Madhav Nidan***
Atisamvruta	*Samvruta*	*Shweta*	*Atisamvruta*	
Ativivruta	*Vivruta*	*Avasanna Vartma*	*Ativivruta*	
Atikathina	*Kathina*	*Athisthoola Vartma*	*Kathina*	
Mrudu	*Mruduta*	*Atipinjara*	*Atimrudu*	
Utsanna	*Atiutsanna*	*Neela*	*Atiutsadha*	*Utsangi*
Avasanna	*Avasanna*	*Shyava*	*Avasadha*	
Atisheeta	*Atisheeta*	*Atipidaka*	*Atisheeta*	
Atyushna	*Atyushna*	*Rakta*	*Ushna*	
Krushna, Rakta	*Raktatva*	*Krushna*	*Rakta*	
Peeta, Shukla	*Panduta*	*Panduta*	*Krushna*	
Pootipuya	*Pootipuya*	*Ropya*	*Panduta*	
Pootimamsa	*Pootimamsa*	*Kumbhi mukha*	*Pooti mamsa*	
Pootisira	*Pootisira*	*Atipootika*	*Pooti sira*	
Pootisnayu	*Pootisnayu*		*Pootisnayu*	
Pootipuyasrava			*Pootipuya*	*Pootisrava*

Sushrut	***Ashtang Hridaya***	***Charak***	***Ashtang Sangraha***	***Madhav Nidan***
Dushtaraktasrava				*Dushtasruk*
Amanodnyagandha			*Utsangi*	*Pootigandha*
Amanodnyadarshana				
Atyarthadaha	*Daha*		*Daha*	
Atyarthapaka			*Paka*	
Atyartharaga	*Karshnya*		*Upadravas*	
Atyarthavedana	*Atiruk*		*Vedana*	
Pidaka	*Utsangita*		*Pitaka*	
Kandu	*Kandu*		*Kandu*	
Shopha	*Shwayathu*		*Shwayathu*	
Deergha Kalanubandhi	*Deergha Kalanubandhi*		*Deergha Kalanubandha*	*Chirasthita*

A *Dushtavrana* that shows the following signs and symptoms can be considered as:-

- Too narrow → tubercular ulcer, sinus and fistula in ano.
- Too wide → diabetic foot, gangrene, venous ulcer.
- Too soft → diabetic ulcer with putrefied muscles.
- Too elevated → a wound with unhealthy, pale granulation tissue
- Too cold → a wound or cold abscess.
- Too hot → acute inflammatory condition.
- Colour → If black, it may be a venous ulcer; red an ulcer with inflamed margin and yellow the floor of a wound covered with

necrosed tissues, while white can be considered to be with whitish slough and necrosed tissue.

- Full of putrefied pus, putrefied muscles, vessels, ligaments, discharging pus move from oblique tract e.g. Fistula in ano, having deep base.
- Having deep base e.g. Tropic ulcer.
- Necrosed tissue with foul smelling due to infection, more painful with heat suppuration redness e.g. Abscess.

ACCORDING TO SHAPE AND SIZE:-

Four types of *Vrana* are described, normal shape of Vrana like:

Ayata (rectangular)	*Chatusra* (square)
Vritta (circular)	*Triputa* (triangular)

Any other shape except the above mentioned is known as *Dushtavrana.* Excessively constricted or spread wounds, raised or depressed or ugly are considered as *Dushtavrana.*

ACCORDING TO CONSISTENCY:

If the wound is either too hard or too soft in consistency and is composed of dead tissue with slough and putrefying debris, it indicates *Dushtavrana.*

ACCORDING TO COLOUR:

Any discolouration on the periphery of the wound and its margins according to the *Doshas.* like blackish, bluish, yellowish, and whitish or mixed discolouration indicates *Dushtavrana.*

PROCESS OF *VRANA ROPANA* (Wound healing)

***SHUDDHA VRANA*:**

It is the *Doshas* that are solely responsible for a *Vrana* to

be transformed into a *Dushtavrana* or *Shuddhavrana*. Each dosha plays a vital role in the *Vrana Ropana* too, thereby converting a *Dushtavrana* to a *Shuddhavrana*. The features mentioned by *Sushrut* and *Vagbhat* are almost similar.

Shuddhavrana is one, which is free from the localization of *Doshas*. A *Vrana* which is not characterized by the *sthanik Tridosha* and has *Shyava oshtha* has developed *Sama Pidaka*, does not have *Vedana* and *Srava* is said to be a *Shuddhavrana*.

In other words a *Vrana* which resembles *Jihvatalabha*, is *Mrudu-Snigdha*, is *Vedana* and *Srava-rahit* and good looking is said to be *Shuddha*.

Table – 3

Shuddha Vrana Lakshana* according to various *Acharyas

Sushrut	***Charak***	***Ashtang Sangraha.***	***Ashtang Hridaya.***	***Madhav Nidan.***
Doshadushti rahit, has Shyava Oshtha, resembles Jihva talabha and is Mrudu, Snigdha, no Vedana, Srava, good looking and has Sama Pidika	*Na – Atirakta, Pandu, Shyava, Na-ati-ruk, Utsanna, Utsangi,*	*Doshadushti-rahit, resembles Jihva in appearance Shlakshna, has Shyava Oshtha, centre is elevated and no Vedana or Srava*	*Resembles Jihva in colour, Mrudu, Shlakshna with Shyava Oshtha, Samapidika, has Unnata Madhya, is Upadrava-rahit*	*Resembles Jihva Talabha and is Atimrudu, Shlakshna, Snigdha, Suvyavasthita, has Alpa-Vedana and is Nirasrava.*

***RUHYAMANA VRANA*:**

The *Vrana* which has *Kapot Varna*, is devoid of *kleda* and has *Sthira Pitika* is said to be a *Ruhyamana Vrana*. A similar description is also mentioned by *Vagbhat* and in *Madhav Nidan*.

SAMYAK RUDHA VRANA:

The *Vrana* which has healed at its site without any *Granthi, Vedana* or *Shotha*, shows the colour as that of the normal skin and is even in appearance is said to be *Samyak Rudha.*

***VRANA PARIKSHANA*:**

By the proper examination of *Vrana* one can assess the *Doshas* involved in it and plan its correct management. The examination can be grouped under two headings.

A) *Sarvadaihik Parikshana* :

Sr. no.	***Pariksha***	***Parikshana***
1.	*Trividha (Vagbhat, Charak)*	*Darshana, Sparshan and Prashna.*
2.	*Shadvidha Pariksha (Sushrut)*	*Shabda, Sparsha, Rupa, Rasa, Gandha and Prashna*
3.	*Ashtvavidha Pariksha (Yogratnakar)*	*Nadi, Mutra, Mala, Jihva, Shabda, Sparsha, Drik, Akriti.*

A definite diagnosis, a clear knowledge of complications, the prognosis of the *Vrana* and its management is possible by the above methods.

B) *Sthanik Parikshana* :

This is based on *Pancha Lakshana* that can be used to examine a *Vrana* clinically,

षण्मूलो ऽष्टपरिग्राही पंचलक्षण लक्षितः। सु. चि. १/३४

1. *VRANA VASTU*:

The site or of position *Vrana* needs to be considered in *Sthanik Parikshana.*

१. त्वङ्मांससिरास्नायू अस्थि संधि कोष्ठमर्माणि इत्यष्टौ व्रणवस्तुनि । अत्र सर्वव्रणसन्निवेश : ।

सु. सू. २२/३

२. त्वक् सिरा मांसमेदा ऽस्थि स्नायु मर्मातराश्रया : ।

व्रणस्थानानि निर्दिष्टान्यष्टावेतानि संग्रहे ॥ च. चि. २५/२६

Sushrut quotes 8 *Vranavastus*:

1. Twacha	*5. Asthi*
2. Mamsa	*6. Sandhi*
3. Sira	*7. Koshtha*
4. Snayu	*8. Marma*

Charakacharya only replaces '*Sandhi*' with *'Meda'*.

Thus any ulcer or wound in the body is formed on any of these structures.

Madhav Nidan also explains the *Samanya* and *Vishesha lakshana* in case of injury to *Mamsa, Sira, Snayu, Sandhi, Asthi* and *Marm-ashrit Vranas* as follows:

Vranavastu	***Lakshanas***
Injury to *Mamsa, Sira, Snayu, Sandhi, Asthi*	***Samanya Lakshana :*** - *Bhrama, Pralapa, Vichestana,Pramoha, lani,Ushnata,Murcha, Teevraruja,Raktasrava resembling Mamsodaka,* loss of functions of I*ndriyas* etc.
	Vishesha Lakshana
Injury to *Sira*	Profuse discharge of *Indragopa varna*
Injury to *Snayu*	Decrease in height, drooping, no Pain, *Vrana* takes long time to heal
Injury to *Sandhi*	Increase in *Shotha*, severe pain, loss of strength, total loss of function etc.
Injury to *Asthi*	Severe pain continuously throughout the day and night, no relief in any posture.
Injury to *Mamsa Marma*	Pallor, loss of tactile sensation.

2) *VRANA AKRUTI* (Size, Shape):

व्रणाकृती

१. तत्र आयत : चतुरसो वृत्त : त्रिपुटक इति व्रणाकृतिसमास : । शेषास्तु विकृताकृतय:॥

सु. सू. २२/५

२. आयताश्चतुरासाश्च त्र्यसा मण्डलिनस्तथा।

अर्धचंद्रप्रतीकाशा विशाला : कुटिलास्तथा ॥

शराव निम्नमध्याश्च यवमध्यास्तथाऽपरे ।

एवं प्रकाराकृतयो भवन्त्यागन्तवो व्रणा: ॥

सु.चि. २ / ५,६

३. शक्तिकुन्तध्वजरथा वाजिवारणगोवृषा:।

येषु चाप्यवभासरेन् प्रासादाकृतयस्तथा ॥

सु.सू. २८/१८

Sushrut has described two major types of *Akrutis* as follows:

***Avikruta Akruti*:**

Vrana-akruti can be described in specific geometric presentation. It includes 4 types

Sr. No.	*Sushrut*	*Dalhan*
1.	*Aayata* (Rectangular)	*Deergha*
2.	*Chaturastra* (Square)	*Chatushkona*
3.	*Vrutto* (Round)	*Vartula*
4.	*Triputaka* (Triangular)	*Trikonaha*

Aayata, Chaturastra, Vrutta, Triputaka are the shapes of *Vrana* as per *Sushrut*. Others with abnormal shapes are treated with difficulty.

According to *Vagbhat,* shape of *Vrana* is considered according to the shape of the *Shalya*. Shapes of *Agantuja Vranas* are *Aayata, Chaturastra, Trayastra, Mandalina, Ardhachandrakara, Vishala* and *Kutila* etc. Some resemble *Sharavanimnamadhyascha*, others with elevation in the centre etc. while *Agantuja Vrana* has innumerable shapes.

***Vikrut Akruti*:**

Generally *Agantu Vranas* are *vikrutakruti.* Their shape cannot be described accurately in terms of geometrical signs.
Therefore a sort of analogue is used. These are of 4 types:

1. *Ardhachandra* (Semilunar)
2. *Swastik* (Cross)
3. *Ashtapada* (Star-Shaped)
4. *Shakti, Dhwaja, Kunta, Govrusha*, etc.

While describing *Agantu Vrana, Sushrut* has again described their specific shapes as follows:

1. Aayata
2. Trayastra
3. Ardhachandra
4. Kutila
5. Yavamadhya
6. Chaturastra
7. Mandalina
8. Vishala
9. Sharava

These above mentioned shapes are not inflicted by the *Vaidyas*.
Vangasen in his *'Chikitsa SarSangraha'* mentions particular shapes specific to the particular type of *Vrana*, as follows:

Sr. No.	Types of *Vrana*	Shape of *Vrana*
1.	*Shuddha*	*Suvyavasthita*
2.	*Dushta*	*Utsangi*
3.	*Chhinna*	*Ruju, Tiryak, Aayata*
4.	*Viddha*	*Angatwam, ashayam, vina uttunditam*
5.	*Kshataja Vrana*	*Vishamam Vranamangeshu*

3) *VRANA GANDHA* (Odour, Smell):

व्रणगंध

सर्पिस्तैलवसापूय रक्तश्यावाम्लपूतिका: ।

व्रणानां व्रणगंधज्ञैरष्टौ गंधा : प्रकिर्तिता ॥

च. चि. २५/२७

कटुस्तीक्ष्णश्च विस्रश्च गंधस्तु पवनादिभि: ।

लोहगंधिस्तु रक्तेन व्यामिश्र: सान्निपातिक: ॥

लाजातसीतैलसमा: किंचिद्विस्राश्च गंधत: ॥

ज्ञेया: प्रकृतिगंधा: स्युरतोऽन्यद्गंधवैकृतम् ॥

सु. सू. २८/ ९, १०

मद्यगुर्वाज्यसुमनापद्मचन्दनचम्पकै :

सगन्धा दिव्यगन्धाश्च मुमूर्षूणां व्रणा: स्मृता: ॥

श्ववाजिमूषिकध्वाङ्क्षपूतीवल्लूरमत्कणै: ।

सगन्धा:षड्गन्धाश्च भूमिगन्धाश्च गर्हिता: ॥ सु. सू. २८/ ११, १२

In *'Viparita-Aviparita Vidnyaniyam Adhyaya' Sushrut* classifies *Vrana gandha* in 2 types:–

A) *Prakruta gandha*

'Prakruta gandha' are found in *'Sadhyavrana'.*

C) *Vikrut gandha*:

'Vikruta Gandha' is found in *'Asadhya Vrana'.*

1) *Sugandha* :

Madya, Agaru, Padma, Champak, Ajjya, Sumana, Chandan, Divya.

4) *Durgandha* :

Shwanagandha, Mushakagandha, Pootivalur, Pankagandha, Wajigandha, Dwanksha, Bhumigandha.

Vangasen also describes the abovesaid *Gandhas*, but in addition, he also mentions *Gatra-daurgandhya* (foul odour to the whole body) and *Aasya-lohit gandhatwam* (*Lohita gandha'* of oral cavity) in case of *'Koshtha bhedajanya' Vrana.*

According to *Charakacharya*, there are eight types of *Vrana Gandha*:–

1. Sarpi
2. Taila
3. Vasa
4. Puya
5. Rakta
6. Shyava
7. Amla
8. Puti

Sr. No.	*Dosha*	*Gandha*
1.	*Vata*	*Katu*
2.	*Pitta*	*Teekshna*
3.	*Kapha*	*Visra*
4.	*Rakta*	*Loha*
5.	*Tridosha*	*Vyamishra*
6.	*Vata-Pitta*	*Lajavat*
7.	*Vata-Kapha*	*Atasivat*
8.	*Pitta-Kapha*	*Tailvat*

Dwidoshaja (combination) *Vrana* have some odour called as *'Ishat-visra gandha' (Dalhan).*

VRANA SRAVA:

लसिकाजलपूयासृग्धारिद्रारुणपिंजरा : ।

कषायनीलहरितस्निग्धरुक्षसितासिता ॥

इति रुपै : समुदिष्टा व्रणास्रावाश्चतुदश ॥ च. चि. २५/२८-२९

Colour of *Vrana* according to the involvement of *Doshas*

Dosha	*Colour of Vrana*
Vata	*Bhasma, Kapota, Asthi, Parusha, Aruna, Krushna.*
Pitta and Rakta	*Neela, Peeta, Harita, Shyava, Krushna, Rakta, Kapila, Pingala.*
Kapha	*Shweta, Pandu, Snigdha.*
Sannipataja	*Colour of mixed characters*

SADHYA ASADHYATA* OF *VRANA:

Dushtavrana does not respond equally to their treatment. Some of them may be cured with great difficulty *(Krichra Sadhya)*, others may be hardly curable (Yapya) or not curable *(Asadhya).*

The prognosis of such wounds depends on the following factors:

- **Site of the wound:**

If the wound is situated on the buttocks, rectum, genitals, forehead, cheeks, lips, back, ear, scrotum, abdomen, root of neck and interior of the mouth it heals easily.

On the other hand, a wound located in the eyes, teeth, nose, temporal area, umbilicus, breast or joints is not as easily cured.`

- **Shape of the wound:**

The wounds which are long, rectangular, circular or triangular are easily curable, whereas other shapes are difficult to cure.

- **Presence of foreign bodies in wound:**

This delay wound healing.

- **Constitution of the patient:**

In young, strong, Pravara Satva patients wounds are easy to cure.

***SUKHA SADHYA VRANA*:**

- The prognosis of wound healing is explained according to the involved tissues i.e. healing becomes difficult, as the *Uttarottara Dhatu* is involved.
- If the patient is *Vayastha, Pranavan, Drudha, Satvavan*, and, he can tolerate the different procedures and the wound heals easily.

***KRICHRASADHYA VRANA*:**

- If the *Vranita* is not *Vayastha, Pranavan, Drudha, Satvavan* but is *Vruddha, Krusha, Alpaprana* and *Bheeru*, then the wound healing will be difficult.
- Persons suffering from *Kushta, Madhumeha, Shoshita, Vishadushti Vrana* and having a recurred wound at the same site are difficult to heal.

***YAPYA VRANA*:**

- *Vranas* such as *Avapatika, Niruddha Prakasha, Sanniruddha Guda, Visarpa, Jathara Sthita, Koshtaja*, glandular swellings, diabetic and skin lesions where maggots are present, Bone fracture, *Urahkshata, Vrana Granthi* etc. are possible to relieve but are not curable.

ASADHYA VRANA:

- *Vrana* which are elevated like *Mamsapinda,* with excessive discharge, containing *Pooya* inside, associated with *Vedana*, having edges like *Ashwa Apana.*
- Indurated and protruded like *Goshringa*, those discharging *Dushta Rudhira*, and having *Mrudu Mamsankura* (soft granulating tissue), *Tanu, Sheeta, Picchila Srava* or elevated in centre.
- *Peeta* or *asita sravi, mutra* or *purisha sravi Koshtastha Vrana*, those having discharges of *Pooya* and *Rakta, Sarvatogata Vrana.*
- *Vrana* in person with *Heena Mamsa*, discharging *Pooya* or *Rakta* and associated with *Arochaka, Avipaka, Kasa, Shwasa* like *Upadravas*.
- *Bhinna Vrana* in *Shira* or *Kapala,* followed by appearance of *Mastulunga,* features of all the 3 vitiated *Doshas* or with *Kasa* and *Shwasa* are incurable.
- In improper treatment, a *Sadhya Vrana* becomes *Yapya, Yapya* becomes *Asadhya* and *Asadhya* may cause the death of the patient.

***UPADRAVAS*:**

These are mainly classified as

A) *Vranasya Upadravas* :(Complication of *Vrana*)

These are five relating to abnormality in *Akruti, Vedana, Gandha, Srava* and *Varna.*

B) *Vranitasya Upadravas*:(Complication of *Vranita*)

According to ***Sushrutacharya*** 10 types of *Upadravas*:

Jwara, Atisara, Moorcha, Hikka, Chhardi, Arochaka, Shwasa, Kasa, Avipaka, Trishna.

According to ***Charakacharya*** 16 types of *Upadravas:*

Visarpa, Pakshaghata, Sirastambha, Apatanaka, Moha, Unmada, Vrana, Ruk, Jwara, Trishna, Hanugraha, Kasa, Chhardi, Atisara, Hikka, Shwasa and Vepathu.

***VRANA* AS *UPADRAVA*:**

Vrana itself is an *Upadrava* in diseases like *Prameha, Vatarakta, Kushtha, Visarpa, Shotha* and *Arsha (bahya).*

***PATHYA-APATHYA* OF *VRANA*:**

PATHYA:

The *Vranita* should consume *Jeerna Shali, Odana* which is warm and unctuous with *Jangal Mamsa*, soup prepared from *Tanduliyaka, Jeevanti, Patola, Karavellaka, Dadima, Amalaka* etc. He should not sleep during the day and should remain inside the house away from breeze, his nails and hair should be clean and he should resort to observance of auspicious rites.

APATHYA:

The *Vranita* should not consume *Navadhanya, Masha, Tila, Kalaya, Kulattha, Nishpava, Harita Shaka, Katu-Amla-Lavana Rasatmaka dravyas, Guda, Sushka Shaka,* eatables made from *Pishta, Aja-Avika-Anoop, Mamsa, Sheeta Udaka, Krushara, Payasa, Dadhi, Dugdha* etc. A person who is habituated to drinking Madya should avoid using *Maireya, Arishta, Asava, Seedhu* etc.

He should also avoid *Vata-Atapa-Raja-Dhooma sevana, Atibhojana, Bhaya, Shoka, Krodha, Ratri Jagarana, Vishamashana, Vyayama, Upavasa, Chankramana* etc.

***VRANA CHIKITSA*:**

In *Ayurved*, the treatment of *Vrana* is described in detail according to its types, *Awastha* and *Dosha* of the *Vrana*. *Sushrut* has described it further, by considering very minute aspects of the *Vrana*. He has also mentioned *Pathya–Apathya, Vranitagar* and *Vranitopasana.*

Vrana Chikitsa should be done in *Vranitagara* to prevent the invasion of *Nishacharas* in the Vranita. The *Vranita* will not suffer from physical, mental and traumatic disorders by residing in such an *Agara* where *rakshakarma* may be done along with *Dhoopana.*

❖ ***Charak Samhita:***

Charak has mentioned 36 *Upakrama*s for the treatment of *Vrana* and has also explained its *Samanya* and *Vishesha Chikitsa.*

शोफघ्नं षड्विधं चैव शस्त्रकर्मावपीडनम्।

निर्वापणं ससन्धानं स्वेदः शमनमेषणम् ॥

शोधनौ रोपणीयौ च कषायौ सप्रलेपनौ ।

द्वे तैले तद्गुणे पत्रं छेदने द्वे च बन्धने ॥

भोज्यमुत्सादनं दाहो द्विविधः सावसादनः ।

काठिन्यमार्दवकरे धूपनालेपने शुभे ।

व्रणावचूर्णनं वर्ण्य रोपणं लोमरोहणम् ।

इति षट्त्रिंशदुद्दिष्टा व्रणानां समपक्र मा: ॥ च. सू. २० / ३९ ते ४३

1. *Samanya Chikitsa*:

Vranitasya should be given *Shodhana* by *Vamana* or *Virechana, Basti* or by *Raktamokshana* with help of *Shastra*. When the body becomes *Shuddha*, the *Vrana* heals spontaneously and easily.

2. *Vishesha Chikitsa*: (as per *Dosha*)

***Vataja Vrana Chikitsa*:**

Person suffering from *Vataja Vrana* should be treated with *Sampoorana, Snehapana, Swedana, Upanaha, Pradeha,* and *Parisheka* which are of unctuous nature.

***Pittaja Vrana Chikitsa*:**

Person suffering from *Pittaja Vrana* should be treated with *Pradeha, Parisheka, Sarpipana and Virechana using Sheetala-Madhura-Tikta dravyas.*

Kaphaja Vrana Chikitsa:

Person suffering from *Kaphaja Vrana* should be treated with *Pradeha, Parishechana,* prepared of *Kashaya-Katu-Ruksha-Ushna dravyas* and *Langhana, Pachana* etc.

❖ ***Ashtang Sangraha***

1) Pradeha
2) Pralepa
3) Raktamokshana
4) Sweda
5) Utkarika
6) Upanaha
7) Parisheka
8) Vimlapana
9) Prapeedana
10) Shodhana
11) Rasakriya
12) Dhupana
13) Nirvapana
14) Utsadana
15) Avasadana
16) Mrudukarma
17) Darunkarma
18) Ksharakarma
19) Agnikarma
20) Ropana
21) Vranasandhana
22) Romasanjanana

❖ ***Bhela Samhita***

1. *Bhedana*
2. *Pachana*
3. *Stambhana*
4) *Shoshana*
5) *Sravana*
6) *Ropana*

❖ ***Harita Samhita***

1. *Mandavisrav*
2. *Swedana*
3. *Pachana*
4. *Patana*
5) *Shodhana*
6) *Ropana*
7) *Paschatkarma*

❖ ***Bhavaprakash***

1. *Shothahara lepa*
7) *Bhedana*

2. *Parishechana* 8) *Peedana*
3. *Vimlapana* 9) *Shodhana*
4. *Asrukmokshana* 10) *Ropana*
5. *Upanaha* 11) *Varnakarana*
6. *Pachana*

❖ ***Kashyap Samhita:***

Vrana in paediatric cases have been elaborately described in form of the following *Upakramas*:

1. *Dhatrinigraha*
2. *Balanigraha*
3. *Sanshamana*
4. *Bandhana*
5. *Utklinnaprakashana*
6. *Kalka Pranidhana*
7. *Shodhana*
8. *Ropana*
9. *Savarnikaran.*

According to him, *'Vranakarma'* is absolutely contraindicated in paediatric cases. He also mentions contra-indications for following *Upakramas* – viz.

1. *Sravana*
2. *Patana*
3. *Dahana*
4. *Seevana*
5. *Eshana*
6. *Sahas*

❖ ***Sushrut Samhita:***

Sushrut has described sixty modalities of the treatment of *Vrana*. These sixty originate from "seven *upakrama*" in the treatment of *Vranashotha* as "*Sapta Upakramas*". They are –

1. *Vimlapana*
2. *Avasechana*
3. *Upanaha*
4. *Patana*
5. *Shodhana*
6. *Ropana*
7. *Vaikrutapaham*

First three *Upakramas* are for *Vranashotha*. Fourth is *Shastrakarma*, while last three are for *Vrana.*

1. *Vimlapana:*

In case of *Sthira, Manda Ruja Vranashopha*, after *Snehana* and *Swedana* to the part, *Peedana* should be done with a bamboo tube or palm and sole or thumb.

2. *Avasechana*:

In case of *Shopha* of recent onset, *Raktamokshana* should be resorted to, in order to mitigate the *Vedana* and *Paka*. Even in *Vrana* associated with *shopha,* which are *Kathina*, containing *Rakta*, *Vedanayukta* or deep seated, *Rakta Avasechana* should be done. In case of *Shopha* associated with *Visha, Rakta Visravana* should be done by using leech or by *Shastra.*

3. *Upanaha:*

It should be applied in *Aamavastha* and *Vidagdhavastha* of *Vranashopha*.

4. *Patana:*

It should be done in case of *Pakwa Shopha* only.

5. *Shodhana*:

It is one of the important measures in case of *Vrana Chikitsa*. Among 60 *Upakramas* as mentioned earlier *Kashaya, Varti, Kalka, Sarpi, Taila, Rasakriya* and *Avachurnana* are the different methods for *Shodhana*. In case of *Vrana* associated with *Durgandha, Kleda* and *Picchilata, Shodhana* should be done using *Kashaya* of various *Dravyas* or *Shodhana Taila* whereas in case of *Vrana* which has *Utsanna Mamsa*, *Alpasrava* etc. *Shodhana* should be done with *Tila Taila* mixed with *Sarshap Taila.*

6. *Ropana:*

Ropana Kriya should be adopted in *Vranas* which show the features of *Shuddha Vrana. Kashaya, Varti, Kalka, Sarpi, Taila, Rasakriya* and *Avachoornan* are the different methods for *Ropana*.

In case of *Vranas* which are predominant in *Kapha* and *Vata, Ropana* should be done by *Taila* processed with those *Dosha-Shamak Dravyas.*

7. *Vaikrutapaham:*

Even after complete healing of *Vrana* restoration of normal colour, shapes are essential. So *Vaikrutapaham* is a measure which helps in restoration. For this *Krishna Karma, Pandu Karma, Romasanjanana, Lomapaharana* etc. are mentioned.

❖ ***Shashti Upakramas* by *Sushrut:***

तत्र व्रणस्य षष्टिरुपकमा : भवन्ति । तद्यथा अपतर्पणालेप: परिषेको ऽभ्यंग : स्वेदो विम्लापनमुपनाह: पाचनं विस्रावण सीवनं सन्धानं पोडनं शोणितास्थापनं निर्वापणमुक्तारिता कषायो वर्ति: कल्क: सर्पिस्तैलं रसक्रियाऽवचूर्णनं व्रणधूपनमुत्सादनमवसादनं मृदुकर्म दारुणकर्म क्षारकर्माग्निकर्म कृष्णकर्म पाण्डुकर्म प्रतिसारणं रोमसंजननं लोमापहरणं बस्तिकर्मोत्तरबस्तिकर्म: बन्ध: पत्रदानं कृमिघ्नं बृंहणं विषघ्नं शिरोविरोचनं नस्यं कवलधारणं धूमो मधु सर्पिर्यन्त्रमाहारो रक्षाविधानमिति ॥

सु.वि.१/८

1. *Apatarpana*:

i.e. *Langhana – Upavasa.* It should be advised in the case of *Vrana*, full of *Dushit Dosha, Dhatu* and *Mala* to bring them back to normal condition.

2. *Aalepa*:

A *Vranashotha* and an extremely painful *Vrana* are treated with *Aalepa*, i.e. proper medicated plaster.

3. *Parisheka*:

It means washing or sprinkling of a *Vranashotha* with liquids like *Dugdha, Ghrita, Kwath* etc. to specify the *Dushit Dosha.*

4. *Abhyanga*:

A massage by oils used for softening of a *Vranashotha.*

5. *Swedana*:

A hot fomentation for painful, extended, and indurated *Vranashotha* for '*Doshavilayana*'.

6. *Vimlapana*:

The resolution by gentle massage should be done in cases of fixed, *alpa Shulayukta Vranashotha.*

7. *Upanaha*:

A non-suppurated or partly-suppurated *Vranashotha* is treated with *Upanaha* or poultice. This leads to its early resolution or suppuration.

8. *Pachana*:

It is an *Aalepa* of *Teekshna-Ushna Dravyas*, on *Pachyaman Vranashotha* leading to *Pakwavastha*.

9. *Snehapana*:

It means to increase the fat intake for '*Brihan*' in case of *Vataja Vrana* or a *Purvakarma* of *Visravana.* (*Ghrita, Taila*, etc.)

10. *Visravana*:

i.e. bloodletting, is helpful to reduce pain in newly formed *Vranashotha*. It is recommended in the case of *Kathina Shotha* and *Vedanayukta, Visham* and *Savisha Vrana*.

11. *Vamana*:

This is prescribed in patients of *Kapha Dushta*, *Unnatamsayukta* and *Shothayukta Vrana*.

12. *Virechana*:

This is recommended in patients of *Chirakari Vrana* and *Vata-Pittaj Vrana.*

13. *Chhedana*:

This means an excision of *Kathina, Sthira, Apaki*, and *Snayukothayukta Vrana*.

14. *Bhedana*:

An opening or excision is made into a *Puyayukta, Utsangi*, and *Gatiyukta Vranashotha*.

15. *Darana*:

It means a measure, which contributes to a spontaneous bursting of *Vranashotha* by medicinal application, and is adopted in children, the elderly, *Ksheena*, and apprehensive patients and for *Marmasthita Vrana.*

16. *Lekhana*:

This means scraping. It is done on *Sthula Oshtha, Utsannmamsi* and *Kathin Vrana*. It is also done on *Vrana*, which repeatedly bursts. It is done with *Kshauma, Plota, Pichu,* and *Kharpatra.*

17. *Eshana*:

This means probing. It is done to decide the direction or *Gati* of a *Nadivrana*. It is a measure in which cavities of a sinus or *Vrana* having any foreign body embedded in it is probed. *Vrana* having *Vakra Gati* is probed gently by *Kesha, finger, Karira* or *Eshani*.

18. *Aaharan*:

It means extraction. Any foreign body or *Shalya* is extracted specially from *Sukshmamukhi Vrana*.

19. *Vyadhana*:

This means to puncture. It is done by *Shastra* to let out the *Puya* and *Dosha*. It should be done only on *Pakwavranoshotha.*

20. *Seevana* – सु.सू. २५

सीव्या: मेदसमुत्थाश्च भिन्ना: सुलिखिता गदा: ।

सद्योव्रणाश्च ये चैव चलसंधिव्यपाश्रिता: ॥ १६

न क्षाराग्निविषैर्जुष्टा न च मारुतवाहिन :।

नान्तर्लोहितशल्याश्च ..... ॥ सु.सू. २५/१७

ततो व्रणं समुन्नम्य स्थापयित्वा यथायथम् ।

सीव्येत् सूक्ष्मेण वस्त्रेण वल्कलेनाश्मन्तकस्य च ॥

शणजक्षौमसूत्राभ्यां स्नाय्वा बालेन वा पुन: । २०,२१

अथ क्षौमपिचुच्छन्नं सुस्यूतं प्रतिसारयेत् ।

प्रियङ्ग्वञ्जनयष्ट्याह्व रोध्रचूर्णै : समन्तत : ॥

शल्लकीफलचूर्णैर्वा क्षौमध्यामेन वा पुन: ।

ततो व्रणं यथायोगं बध्दवाचारिकमादिशेत् ॥

सु.सू.२५/२७,२८

Seevana means suturing. *Sushrut* has described *Seevana Karma* in detail along with types of stitches and their indications. *Seevana* is done on *Vrana* having wide gaping wound with loss of skin, *Vrana* in a fleshy part, and without *Puyasrava*, i.e. without infection.

21. *Sandhana*:

This means to join. It is a measure for adhesion of the edges in a fleshy part without suppuration.

22. *Peedana*:

It is indicated to remove *Puya* from *Sukshmamukhi* and *Marmasthita Vrana*. In this procedure, application of medicated plaster or *Aalepa* is done around the mouth of *Puyayukta* and *Sukshmamukhi Vrana*.

23. *Shonitasthapana*:

It is a procedure of inducing haemostasis and is indicated in *Agantuj*, *Sadyovrana* and *Shastrakarmaja Vrana*. *Sushrut* has described 4 ways of *Shonitasthapana*

a) *Sandhana*

b) *Skandana*

c) *Dahana*

d) *Pachana*

अथातिप्रवृत्ते रोध्रमधुक ..... चूर्णैः व्रणमुखमवचूर्ण्य .....।

यथौक्तैर्व्रणबन्धनद्रव्यैः गाढं बध्नीयात् ..... शीतैः प्रदेहपरिषेकैश्चोपाचरेत्।

चतुर्विधं यदेतद्धि रुधिरस्य निवारणम्।

संधानं स्कंदनं चैव पाचनं दहनं तथा ॥

व्रण : कषाय : संधत्ते रक्तं स्कंदयते हिमम्।

तथा संपाचयेद् भस्म दाहः संकोचयेत् सिराः ॥

अस्कंदमाने रुधिरे संधानानि प्रयोजयेत्।

संधाने भृश्यमाने तु पाचनैः समुपाचरेत्।

कल्पैरेतैस्त्रिभिर्वैद्यः प्रयतेत् यथाविधि।

असिद्धिमत्सु चैतेषु दाहः परम इष्यते ॥ सु. सू. १४/४०-४३

24. *Nirvapana*:

It means cold compress. This is done on *Vrana* having *Ushna Guna* i.e. *Pitta-Raktaja Vrana, Dahayukta* and *Jwaryukta Vrana* with the help of proper *Sheeta Dravyas* like *Dugdha, Ghrita* etc.

25. *Utkarika*:

This means poultice. It is indicated for *Ksheenmamsi, Alpasravi, Todayukta, Shulayukta, Kathinyayukta* and *Kampayukta Vrana*. These types of *Vrana* are fomented with poultice-like preparation, i.e. *Utkarika*–cooked with *Vataghna Dravyas*.

26. *Kashaya*:

This means decoction and is indicated in *Dushta* as well as *Shuddhavrana*. Washing of *Dushta Vrana* is done with *Kashaya* of *Shodhan*

Dravyas while washing of *Shuddha Vrana* is done with *Kashaya* of *Ropan Dravyas.*

27. *Kalka*:

It is an application of *Kalka* or paste on *Vrana. Shodhana* and *Ropana Kalka* are applied on *Dushta* and *Shuddha Vrana* respectively. *Shodhana Kalka* is also applied in *Shalyayukta, Anumukhi, Gambhir, Putimamsi Vrana* while *Ropan Kalka* is applied in *Marmasthita Vrana.*

28. *Varti*:

This means plugs or lints. These are made by plastering them with paste of *Shodhan Dravyas.* These are indicated in *Puyayukta, Dushta*, and *Shuddha Vranas. Varti* is useful in *Sukshmamukhi, NadiVrana* and deep *Vrana.*

29. *Ghrita*:

Medicated *Ghrita (Ghee)* is applied on *Vrana.* This *Upakrama* is especially for *Ropana Karma.* In *Dushta Vrana Shodhana Dravya Siddha Ghrita* is used. This *Upakrama* is indicated for *Pittaja, Raktaja, Vishaja, Agantu* and *Gambhir Vrana.*

30. *Taila*:

कफवाताभिभूतानां व्रणानां मतिमान् भिषक् ।

कारयेद्रोपणं तैलं भेषजैस्तद्यथोदितै: ॥

अपेत्तपुतिमांसानां मांसस्थानामरोहताम् ।

कल्क : संरोहण : कार्यस्तिलजो मधुसंयुत : ।

स माधुर्यात्तथौष्ण्याच्च स्नेहाच्चानिलनाशनम् ।

कषायभावान्माधुर्यात्तिक्तत्वाच्चापि पित्तहृत् ।

औष्ण्यात् कषायभावाच्च तिक्तत्वाच्च कफ हित: ।

शोधयेद्रोपयेच्चापि युक्त : शोधनरोपणै: ॥

सु.चि. १/६५-६७

रोपणे सपरिषेके पाने च व्रणिनां सदा ।

तैलं घृतं वा प्रयोज्यं शरीरर्तूनवेक्ष्य हि ॥

सद्य : क्षतव्रणं वैद्य : सशूलं परिषेचयेत् ।

सर्पिषा नातिशीतेन बलातैलेन वा पुन : ॥ सु.चि. १

The application of medicated oil is *Taila Upakrama*. Many types of *Siddha Taila* are used for different types of *Vrana* especially for *Shodhana* and *Ropana Karmas*. *Shodhana Taila* is applied to *Dushta, Utsannamamsi* and *Alpasravi Vrana*. *Ropana Taila* is applied to *Shuddhavrana* and it is also useful in *Vata-Kaphaja Vrana*.

31. *Rasakriya*:

It is indicated for *Shodhana* and *Ropana* effects. Decoction of medicinal Dravyas is further boiled and saturated to achieve *Ghana Awastha*. This *Ghana* is then applied over the *Vrana*. *Shodhana Rasakriya* is applied to *Sthiramamsi* and *Dushtavrana*. *Ropana Rasakriya* is applied to *Sandhisthita, Pittaja, Raktaja* and *Abhighataj Vrana*.

32. *Avachuranana*:

This means sprinkling of *Churna* over *Vrana*. *Shodhana* and *Ropana Churna* are sprinkled over superficial i.e. *Twaksthita, Sthiramamsi, Avikrutakruti* and *Ghrishta Vrana*.

33. *Vranadhoopana*:

It means fumigation that is indicated for *Vataj, Tivrashulayukta* and *Sravi Vrana*. Fumigation is done with many preparations, which are mainly containing *Ghrita, Vacha, Raal* etc.

34. *Utsadana*:

This means elevation that is indicated especially in *Alpamamsi Vrana, Vataja, Vata-Pittaja* and *Ruksha Vrana*. In this process, *Aalepa* of *Vataghna*

Dravyas with *Ghrita* is applied for *Utsadana. Utsadana* is for rising of the beds and cavities of deep *Vranas*.

35. *Avasadana*:

This is indicated for lowering down the *Unnatmamsi Vrana* and is achieved by applying *Avasadan* drugs and *Madhu.*

36. *Mrudukarma*:

i.e. Softening measures that are important in *Vataj, Kathina, Alpamansi Vranas* with the help of lotions, *Ghrita, Swedana* etc.

37. *Darunkarma*:

i.e. Hardening measures that are effective in *Mrudu Vrana. Kashayarasatmaka Dravyas* are used for this purpose.

38. *Ksharakarma*:

i.e. Chemical cauterization which is adopted for *Shodhana* of *Chirakari, Kandu, Kleda* and *Sravayukta Vrana*. For this application of *Teekshna, Ushna Gunatmak Kshara* is used.

39. *Agnikarma*:

i.e. Thermal cauterization is adopted for treating *Atiraktasravi, Sandhichchinna, Ashmarinirharan Shastrakarmaja Vrana.*

40. *Bastikarma*:

A medicated enema is used in case of *Vataj, Ruksha, Chirakari* and *Shalyayukta Vrana*.

41. *Uttarbasti*:

In cases of *Ashmarijanya Mutrasrotasgata Vrana Uttarbasti* is done.

42. *Patradana*:

Leaves of medicinal plants are selected according to *Doshadushti* in *Vrana*, they are lubricated, either heated or cooled and tied over *Vrana*. It serves to generate heat or cold and retain medicated oil at *Vrana*.

43. *Krimighna*:

This is indicated for *Krimiyukta Vrana* for destruction of *Krimi* and relieving *Kandu*. It includes washing by *Kashaya* and application of *Kalka* of *Krimighna Dravyas.*

44. *Bruhana*:

This is indicated for *Vataj, Ruksha*, and *Chirakari Vrana* and in *Krusha* and *Khoshi Rugna*. It includes ingestion of restorative and constructive *Dravyas*.

45. *Vishaghna*:

It is adopted in treating '*Visha*' and *Vishasansargaja Vrana* by using *Vishaghna Dravyas*.

46. *Shirovirechana*:

Urdhvajatrugata and *Kaphaja Vrana* are treated by this measure.

47. *Nasya*:

Shulayukta, Urdhvajatrugata and *Vataj Vrana* are treated by *Nasya*.

48. *Kavalgraha*:

It means medicated gargles and is indicated in *Urdhvajatrugata, Mukhagata, Jivhasthita* and *Dantamulagata Vrana*.

49. *Dhoomapana*:

It means inhaling of smoke of medicated *Dravyas* and is indicated in *Urdhvajatrugata, Vatakaphatmaka Vrana.*

50. *Madhu*:

Sadyovrana and *Vistrutvrana* are treated by applying *Madhu*.

51. *Sarpi*:

Ghrita is applied for *Ropana* and *Daha-Shamana* in *Agantuj* and *Pittaraktaja Vrana.*

52. *Yantra*:

It is used to remove *Shalya* embedded in *Sukshmamukhi* and deep *Vrana*.

53. *Krishanakaran*:

The blackening of white cicatrix by using medicinal drugs such as *Bhallatak Taila*.

54. *Pandukarma*:

Natural and healthy colour of surrounding skin is imparted to black cicatrix by applying medicinal drugs.

55. *Pratisarana*:

It is adopted to impart natural skin colour to a discoloured scar by applying medicinal *Churna.*

56. *Romasanjanana*:

A measure to produce hair on a scar which is lacking hair.

57. *Romashatana*:

This *Upakrama* is used to remove *Roma* from *Romavyapta* and nonhealing *Vrana*. It is done by using *Yantra* as well as by applying medicinal *Dravyas*.

58. *Bandha*:

This *Upakrama* is done after *Vranakarma*. It is necessary to keep the *Vrana* away from foreign bodies, to keep *Gatra* in position and to promote healing.

59. *Ahara*:

To keep the *Dosha* in *Samyavastha* and thereby keep the *Vrana* in *Shuddha Awastha*, proper diet is advised.

60. *Rakshavidhan*:

It is the measure adopted to protect the *Vrana* from *Krimi, Jantu* etc. It is done by keeping *Vranitagara* very clean and by *Dhoopana* by *Krimighna* and *Rakshoghna Dravyas*.

Showing incorporation of *Shashti Upakrama* in *Sapta Upakrama*

7 Upakramas	***60 Upakramas***
Vimlapana	*Apatarpana, Aalepa, Parisheka, Abhyanga, Swedana, Vimlapana.*
Avashechana	*Visravana, Sneha, Vamana, Virechana.*
Upanaha	*Upanaha, Pachana.*
Patana	*Chedana, Bhedana, Dharana, Lekhana, Eshana, Aharana, Vyadhana, Visravana, Seevana.*
Shodhana, Ropana	*Sandhana, Peedana, Shonitasthapana, Nirvapana, Utkarika, Kashaya, Varti, Kalka, Sarpi, Taila, Rasakriya, Choorna, Dhoopana.*
Vaikrutapaham	*Utsadhana – Rakshavidhan.*

Among 36 *Upakarma* mentioned by *Charak, Shophaghna* i.e. treatment of Vrana Shopha which involves *Rakta Avasechana, Langhana, Sneha, Pralepa, Pradeha, Upanaha* etc. can be incorporated under 11 *Upakrama* mentioned by *Sushrut* for *Vrana Shopha*.

Shastra Karma mentioned by *Sushrut* can be incorporated under 6 measures mentioned by *Charak* even though he has told *Eshana* seperately and *Aharana* has been covered under 6 surgical measures itself.

Shodhana, Ropana, Vaikrutapaham mentioned by *Sushrut* can also be incorporated under those mentioned by *Charak* i.e. like *Shodhana-Kashaya,*

Taila, Ghrita, Ropana-Kashaya, Taila, Ghrita, Utsadana, Avasadana, Aalepana (Mardavakara & Kathinyakara) etc.

Thus, it becomes evident that 60 *Upakrama* mentioned by *Sushrut* can be incorporated in 7 *Upakrama* of *Vrana Shopha* and most of those among 60 can be also incorporated under 36 *Upakrama* mentioned by *Charak.*

❖ **Treatment of *Dushtavrana:***

Dushtavrana is treated according to the presence of *Prakupita Dosha. Vamana, Shirovirechana, Virechan, Asthapana Basti, Langhana, Raktamokshana* and specific sort of diet is advised.

For *Vrana Dhavana, Kashaya* are prepared using *Dravyas* of the *Surasadi* and *Rajvrukshadi Ganas, Siddha Ghrita* and *Siddha Taila* of these *Dravyas* are used for *Vranakarma.*

Vividha upkrama according to *doshadushti* are as follows:

1. ***Vataj Vrana:***

   Snehayukta Swedana, Upanaha, Pradeha and *Parisheka* of *Vataghna Dravyas.*

2. ***Pittaj Vrana*:**

   Sheeta, madhura and *Tikta Dravyas* as *Kalka, Pradeha, Kwath* and *Parisheka* are used. *Ghritapana* and *Virechana* are used.

3. ***Kaphaj Vrana*:**

   Katu, Kashaya, Ruksha, Ushna Dravyas as *Pradeha* and *Parishechana* are used. *Langhana* and *Pachana* are advised. *Aahar* composed of *Tikta, Katu, Kashaya Dravyas* should be prescribed.

❖ ***Trividha Karmas:***

1. *Poorva Karma*
2. *Pradhana Karma*
3. *Paschat Karma*

1) Poorva Karma :

Among the 60 *Upakrama* those from *Apatarpana* to *Virechana* (mentioned for *Vranashopha*) are considered as measures of *Poorva Karma.* By means of these measures either pacification of *Vrana Shopha* occurs or it helps ripening.

Among the 7 *Upakrama* of *Vranashopha, Vimlapana, Avasechana* and *Upanaha* should be employed during the *Aama Awastha* of *Vrana Shopha.*

2) *Pradhana Karma* :

Among the 60 *Upakrama* those from *Chedana* to *Seevana (Shastrakarma)* are considered as *Pradhana Karma.* In addition to the *Ashtavidha Shastra Karmas, Dharana Karma* is mentioned in case of *Bala, Vruddha, Bheeru* and *Vrana Shopha* present in *Marma Pradesha* where *Shastra Karma* is contraindicated. This is performed by doing *Peedana* with local application of *Dravyas.*

Among the 7 *Upkrama* of *Vrana Shopha Patana* is considered as *Pradhana Karma.*

3) *Paschat Karma*:

Among the 60 *Upakrama* starting from *Sandhana* to *Rakshavidhana* whereas among the 7 *Upakrama Shodhana, Ropana* and *Vaikrutapaham* are considered under *Paschat Karma.*

Treatment of *Agantu Vrana*

A) GENERAL TREATMENT:

- सर्वस्मिन्नेवागन्तुव्रणे तत्कालमेव क्षतोष्मण: प्रसृतस्योपशमनार्थं पित्तवच्छीतक्रियावचारणविधिविशेष : सन्धानार्थं च मधुघृतप्रयोग इत्यतेद्विकारणोत्थप्रयोजनम्। उत्तरकालं तु दोषोप्लवविशेषाच्छारीरवत् प्रतिकार: ॥ ४

- क्षतोष्मण: इति उष्मा प्रहारसंघट्टजनितं तेज: । उत्तरकालमिति सप्ताहादूर्ध्वमित्यर्थ: यतो सद्योव्रणत्वम् सप्ताहमेव॥ डल्हण

- क्षतोष्मणोनिग्रहार्थ तत्कालं विसृतस्य च।

  कषायशीतमधुरस्निग्धा लेपादयो हिता: ॥

  सद्योव्रणेष्वायतेषु सन्धानार्थ विशेषत:।

  मधुसर्पिश्च युञ्जीत पित्तघ्नीश्च हिमा: क्रिया : ॥

  वा. उ. २६ .. ७,८

- स्नेहपानं हितं तत्र तत्सेको विहितस्तथा ।

  वेशवारै: सकृशरै: सुस्निग्धैश्चोपनाहम्॥

  धान्यस्वेदांश्च कुर्वात स्निग्धान्यालेपनानि च ।

  सु. चि. २/२३-२५

- ये व्रणा विवृता : केचिच्छिर:पार्श्वावलम्बिन : ।

  तान् सीव्येद्विधिनोक्तेन बघ्नीयाद् गाढमेव च ॥

  सु. चि. २/३०

In case of an *Agantu Vrana* the following things need to be considered.

1. *Raktasrava*
2. *Shool – Sthanik vata prakopajanya.*
3. *Pranashta shalya.*

For *Vedanashamana*

→ *Vata Shamana Chikitsa* is to be done which includes *Snehapana, Ghrita / Taila Parisheka, Madhur* and *Sheeta Aalepa* and *Ushna Taila Basti.*

→ For *Raktastambhana, Kashaya Rasatmaka Dravyas* are used or *Madhu-Sarpi* is applied, *Nirvapana, Sheeta Parisheka* and *Ropana Ghrita* are used.

B) SPECIFIC TREATMENT:

According to different types of *Agantu Vrana*, the specific treatment is as follows:

पिच्चिते च विघृष्टे च नातिस्त्रवति शोणितम् ।

अगच्छति भृशं तस्मिन् दाह : पाकश्च जायते ॥

तत्रोष्मणो निग्रहार्थं तथा दाहप्रपाकयो: ।

शीतमालेपनं कार्यं परिषेकाश्च शीतल: ॥ सु. चि. २/२६, २७

Vrana	**Treatment**
a) Chhinna Vrana	*Shodhana,* removal of foreign bodies if present, *Raktastambhak Parisheka, Seevana* or a application of *Shodhan* a *Ghrita* and *Taila* if *Seevana* is contra-indicated.
b) Bhinna Vrana	*Raktastambhana,* proper placement of the injured organ, *Seevana Karma* after thorough exploration, *Siddha taila* of *Tagar, Agaru, Jati* etc, and *Pattabandhan.*
c) Viddha Vrana	*Raktastambhana, Shalya Nirharan*, insertion of *Taila Varti* for *Ropana.*
d) Kshataja Vrana	*Raktastambhana*, local *Shodhana* by *Kashaya*, removal of foreign bodies, *Seevana*, application of *Ropana Taila, Patta-Bandhan.*
e) Pichchita Vrana	*Sheetal Lepa, Parishek, Shalya Nirharan, Shodhan, Ropan, Bandhan.*
f) Ghrishta Vrana	*Sheeta Lepa, Parisheka; Avachuranana* of *Ropana Dravyas* like *Lodhra.*

❖ ***PATTA BANDHANA* (BANDAGING):**

In *'Agropaharaniya adhyaya', Sushruta* has described details of *Vranabandha.* In the '*Vranalepanabandhan vidhi adhyaya'* he mentions the importance of *Vranabandhana* as:–

- सुखमेव व्रणी शेते सुखं गच्छति तिष्ठति ।

  सुखं यय्यासनस्थस्य क्षिप्रं संरोहति व्रण : ॥

- यन्त्रणा .... यन्त्रणं पट्टग्रन्थेर्बन्धनम् ।

  ऊर्ध्व तिर्यगधस्ताच्च यन्त्रणा त्रिविधा स्मृता ।

- उत्तिष्ठितो निषण्णस्य शयनं चाधिगच्छत: ।

  गच्छतो विविधैयानैर्नास्य दुष्यति स व्रण : ॥

- ततो बंध : प्रधानम् । तेन शुध्दि : व्रणरोपणम् अस्थिसंधिस्थैर्य च ॥

  सु. सू. १८.

- समन्तात् परिपीडयांगुल्या, व्रणमभिमृज्य, प्रक्षाल्य कषायेण, प्रोतेनोदकमादाय, तिलकल्कमधुसर्पि: प्रगाढमौषधयुक्तां नातिस्निग्धां नातिरुक्षां वर्ति प्रणिदध्दयात्; तत: कल्केनाच्छाद्य, घनां कवलिकां दत्त्वा, वस्त्रपट्टे बध्निनयात्, वेदनारक्षौघ्नैधूपैर्धूपयेत् रक्षौघ्नैश्च मन्त्रै रक्षां कुर्वीत् ॥

- तत : तृतीयेऽहनि विमुच्यैवमेव बध्नीयाद् वस्त्रपट्टेन न चैनं त्वरमाणोऽपरेद्युर्मोक्षयेत्।

  द्वितीयदिवसपरिमोक्षणाद् विग्रथियो व्रणश्चिरादुपसंहरोति तीव्ररुजश्च भवति ।

- हेमन्ते शिशिरे चैव वसन्ते चापि मोक्षयेत्।

  त्र्यहाद्द्वयाच्छरद्ग्रीष्मवर्षास्वपि च बुध्दिमान् ॥

  सु.चि.५

Thus by applying proper bandage, one can achieve.

⟶ Prevention of contamination of *Vrana.*

→ Hastening of healing process.

→ Support and stabilization of joints.

Material Used for *Vranabandha*:

व्रणबंधनद्रव्याणि ....

क्षौमकार्पासाविकदुकूलकौशैयत्रौर्णचीनपट्टचर्मान्तर्वल्कलालाबू

शकललताविदलरज्जूतूलफलसन्तानिकालौहानिति।

सु. सू. १८/१८

Kshauma – flax, *Karpas* – cotton, *Cheena* – cloth, *Charmapatra*-leather, *Valkala*-inner bark of plants, *Rajju*-ropes, Sheep wool- fine silk, *Lohani*-thick cloth with cream and metals etc.

- **Types of bandaging:**

बन्धविशेषा : .....

तत्रकोशदामउत्संगीस्वस्तिकअनुवेल्लितमुतोलीमंडलस्थगिकायमकखट्वाचीनविबंधपंचांगी

वितानगोफणा चेति चतुर्दश बन्धविशेषा : ॥ सु. सू. १८

(1) Kosha	*(5) Mutoli*	*(9) Khatva*	*(13) Gophana*
(2) Dama	*(6) Mandala*	*(10) Cheena*	*(14) Panchangi*
(3) Swastik	*(7) Sthagika*	*(11) Vibandha*	
(4) Anuvellita	*(8) Yamaka*	*(12) Veetan*	

Methods of Bandaging:

Bandaging must be done by considering the site of *Vrana*, *Doshadushti, Vrana Awastha* and *Rutu*.

- तत्र घनां कवलिकां दत्वा वामहस्तपरिक्षेपमृजुमनाविध्दमसंकुचितं मृदुपट्टं निवेश्य बध्नीयात् ।

औषधवस्त्रयोरन्तरे या दीयते औषधसंस्थापनार्थ औदुम्बरादि पत्राणि वा सा कवलिका इत्युच्यते।

अन्येद्विणचतुर्गुणमृदुकर्पटविरचितांकवलिकामाहुः।

सु. सू. १८

- विकेशिका .....

  न च विकेशिकौषधे अतिस्निग्धे अतिरुक्षे विषमे वा कुर्वीत् ।

  विकेशिकौषधेइतितिलकल्कमधुघृताक्तवस्तारस्यसूत्रस्यवावर्तिविकेशिकासाच

  पूतिमांसोत्संगगतिपूयगर्भेषु व्रर्णेषु निक्षिप्यते॥

  सु. सू. १८

First, *kavalika* and dressing is applied. A thick pad is put over it and after that bandaging is done. The knot of the bandage should not come over the wound as it would cause pain. It should be applied above, below or on the lateral side of wound. Bandage is held in left hand and applied evenly without any folds and tied gently. According to the site of *Vrana*, bandages are of three types (based on how tight a bandage is).

1. Tight bandage: – (*Gadha Bandha*):

   Applied on *Vranas* at the buttocks, lumbar region, inguinal region, axillae, thighs and head.

2. Loose Bandage:– (*Sheethila Bandha*) :

   Applied over eyes and joints.

3. Even Bandage:– (*Sama Bandha*):

   Applied on extremities, face, ears, penis, scrotum, chest and abdomen.

***Vranabandhana Kala*:**

1. For '*Pitta-Dushta' Vrana* and in '*Sharad*' and '*Grishma' Rutu*, twice daily.
2. For '*Kaphadushta' Vrana* and in *'Hemant'* and '*Vasant*' *Rutu*, every third day.
3. For '*Vata Dushta*' *Vrana* and in '*Hemant*' and '*Vasant*' *Rutu* every third day.

In *Sharada, Grishma* and *Varsha rutu*, bandages should be released every second day.

Sushrut advises *bandhavidhi* according to *Kala, Dosha* and *Bala* of the patient.

Contra Indications of *Vranabandhana*:-

अबन्ध्या: पित्तरक्त अभिघात निमित्ता .... ॥ सु. सू. १८

1. Wounds caused by vitiated *Pitta* and *Rakta*.
2. Wounds caused by poisons
3. Wounds associated with oedema, burnings etc.
4. Leparomatous ulcer, diabetic ulcer, Ratbite etc.
5. In excessive granulation.
6. In case of gangrene and extensive perianal suppuration.

***Vranitopasana* – Convalescence:**

- व्रणितस्य संजातव्रणस्य उपासनं सेवनं तच्च गृहशय्यासनादिकम् ।

  डल्हण

- प्रशस्तवास्तुनि गृहे शुचावातपवर्जिते।

  निवाते न च रोगा : स्यु : शारीरागन्तुमानसा : ॥ ४

- न च दिवानिद्रावशग : स्यात् ।

- उत्थानसंवेशनपरिवर्तनचङ्क्रमणोच्चैर्भाषणद्यास्वात्मचेष्टास्वप्रमत्तो व्रणं संरक्षेत् ।

- स्थानासनं चङ्क्रमणं दिवास्वप्नं तथैव च ।

  व्रणितो न विषेवेत शक्तिमानपि मानव : ॥ १२

- गम्यानां च स्त्रीणां संदर्शनसंभाषणसंस्पर्शनानि दूरत: एव परिहरेत् । १३

- तक्रान्तो नवधान्यादिर्योऽयं वर्ग : उदाहृता : ।

  दोषसंजननो हयेष: विज्ञेय : पूयवर्धन: ॥ १७

- वातातपोरजोधूमावश्यायातिसेवनातिभोजनश्रवणदर्शनेर्ष्यामर्ष

भयशोकध्यानरात्रिजागरणविषमाशनयनोपवासवाग्व्यायामस्थानचङ्क्रमण

शीतवातविरुध्दाध्यशनाजीर्णमक्षिकाद्याबाधा: परिहरेत् ॥ २०

- सदा नीचनखरोम्णा शुचिना शुक्लवाससा शान्तिमंगलदेवताब्राह्मणगुरुपरेण भवितव्यमिति ॥ २३
- छत्रामतिच्छत्रां लाङ्गलीं जटिलां ब्रह्मचारिणीं लक्ष्मीं गुहामतिगुहां वचानतिविषां शतवीर्या

  सहस्त्रवीर्या सिध्दार्थकांश्च शिरसा धारयेत्॥ २९
- शतवीर्या शतावरी नीलदुर्वेत्यन्ये सहस्त्रवीर्या श्वेतदुर्वा ॥ डल्हण : तत्रैव ।
- व्यजेत बालव्यजनैव्रणच न च विघट्टयेत् ।

  न तुदेन्न च कण्डूयेच्छयान : परिपालयेत् ॥ ३०
- व्रणी वैद्यवशे तिष्ठञ् शीघ्रं व्रणमपोहति ॥
- व्रणे श्वयथुरायासात् स च रागश्च जागरात् ।

  तौ च रुक च दिवास्वापात्ताश्च मृत्युश्च मैथुनात् ॥ ३६

  सु. सू. १९
- लवणाम्लकटूष्णानि विदाहीनि गुरुणि च ।

  वर्जयेदन्नपानानि व्रणी मैथुनमेव च ॥

  च. सू. २०/९७

DISEASE REVIEW- MODERN

ANATOMY AND PHYSIOLOGY OF SKIN (INTEGUMENT)

Skin is the uniform covering of the body and according to the modern science, is considered as an organ since it is made up of different tissues which perform different activities. *Ayurved* too considers '*Twacha*' i.e. skin as an *Indriya*, a special sense organ. The total surface area of the skin, if spread on the ground, would approximately be around 3000 sq. inches.

The skin acts as a protective covering for the body, minimizing the water loss from body tissues. Various sensory nerve endings on the skin help the body from injury by evoking appropriate response to noxious stimuli. The skin also plays an important role in temperature regulation.

The hair follicles, sweat glands and the hair embedded in the dermis and are called as appendages of the skin.

SKIN STRUCTURE:

It is made up of two main layers, viz. 1. Epidermis
2. Dermis

1. Epidermis:

This is the most superficial layer and is composed of stratified squamous type of epithelium. It is derived from the ectoderm. The epidermis achieves its characteristic structure in the 4th month of intra-uterine life.

It consists of four distinct types of cells, mainly the 'Keratinocytes'. These cells produce a protein called 'keratin' which gives firmness and waterproofing to the skin. These keratinocytes are arranged in 4 to 5 layers. The other three types of cell are Melanocytes, Grastenin's cell, and Langerhan's cells. These are arranged in five layers in the areas where exposure to friction is the greatest e.g. palms and soles. The layers are named from outside inwards as follows:

a) Stratum Corneum:

It is most superficially placed and its cells are keratinized. The cell outlines are indistinct and the nuclei are absent. This layer is thickest at the sole and the palm and the thinnest at the lip. Hair, loops, nails, feathers, scales are the special outgrowths of this layer. These cells are continuously shed and replaced. This layer serves as an effective barrier against light, heat waves, bacteria and many chemicals.

b) Stratum Lucidum:

This is a thin, more or less transperant layer, 3 to 5 cells deep, placed below the Stratum Corneum. The cell outline is indistinct and nuclei are absent. The cells contain droplets of 'Eleidin', which is a precursor of keratin.

c) Stratum Granulosum:

It consists of 3 to 5 layers of flattened polyhedral cells filled with keratohyaline granules.

d) Stratum Spinosum:

This is a broad layer of variable thickness and is made up of polyhedral cells. The surface of these cells is apparently covered with minute spines, which interdigitate with spines of adjacent cells. These are consequently known as 'prickle cells'. As the cells move towards the surface, keratin is synthesized within them. Scattered throughout this layer, are branched star-shaped cells known as **Langerhan's cells,** which are capable of active synthesis of DNA.

e) Stratum Germinativum (Stratum Malphigii):

This is composed of a single layer of columnar epithelium which has got transverse, thin, short cytoplasmic processes on its basal lamina by means of which they anchor the epithelium to the underlying dermis. Cells of this layer produce new cells to replace those of above layers by the process of mitosis. At the junction of the epidermis with the dermis, there occurs

number of melanin containing, branched cells known as '**Melanocytes'.**

The above mentioned characteristics of the epidermis are mostly present in palm and soles. Epidermis in general, i.e. in areas other than soles and palms, is thin while Stratum Malphigii and Stratum Corneum are always present. Stratum corneum is also thin and just identifiable.

2. DERMIS (CUTIS VERA OR TRUE SKIN):

The true skin is made up of connective tissue and lies below the epidermis, which it supports and binds to the underlying tissues. It is made up chiefly of collagenous and elastic fibres which provide it with a tensile strength equal to that of a steel wire. It is derived from the mesodermal layer.

The superficial layer of the dermis viz. the '**Papillary layer'** is compact and sends numerous finger-like projections (papillae) into the prickle-cell layer of the epidermis.

The deeper part i.e. the '**Reticular layer'** is composed of loose connective
tissue and is infiltrated with fat. This layer merges imperceptibly into a subcutaneous layer of fat.

Cells of dermis:

1. Fibroblasts - form the fibrous tissue.
2. Cells belonging to reticulo-endothelial system - protect the body from invading bacteria.

The dermis has got a luxuriant capillary blood supply, which forms a network from which hairpin loops supply the tip of the dermal papillae. The blood vessels play an important role in temperature regulation and have got rich vasomotor innervations. There is also a well-organized lymphatic system in the dermis. It is provided with sensory nerve endings of several types for various external stimuli.

The dermis also consists of sweat and sebaceous glands. Sweat glands act as islands for the re-growth of epidermis in case of injury. Sebaceous glands secrete oily material called sebum.

Errectores Pilorum - a small bundle of involuntary muscles that is attached to the hair in such a way that they cause the hair to stand on end is found to be present in this layer.

FUNCTIONS OF THE SKIN:

1. HEAT REGULATION:

The skin acts as an insulating layer as well as a structure capable of transferring heat. In extreme cold climates, skin preserves body heat by decreasing its blood flow and in hot climates or during exercises it increases its blood flow causing sweating and thereby reducing the excess heat.

2. SENSE ORGAN:

It gives the sense of touch, temperature, pressure and pain.

3. PROTECTION:

The skin is the natural dressing that protects the underlying organs from bacterial invasion at the same time protecting the body from the ultra-violet radiations of the sunlight.

4. EXCRETION:

It excretes various drugs, toxins, urea etc.

5. METABOLISM:

Vit.D is synthesized by the skin under the influence of sunlight

6. STORAGE:

It acts as a store of water, fat, vit. D. various drugs etc.

7. NUTRITION:

Many nutritive medicines, oils, ghees can be rubbed over the skin and the underlying structures may be rejuvenated, made healthy or their circulation may be increased.

WOUND

Etymology:

From old English word '*wund*'.

Wounds can result from injurious processes to the involved organs beginning either internally or externally. These can range from controlled acute disruption of tissue by the surgeon's knife to widespread trauma such as burns.

Causes:

- Trauma that may be either accidental or surgical.
- Physical, chemical and microbial agents that give rise to inflammation and may lead to necrosis or destruction of living tissue.
- Ischaemia which leads to infarction.

Classification:

1. **Rank and Wakefield classification:**

A) Tidy wounds:

These are inflicted by sharp instruments and contain no devitalized tissues. They can be closed primarily with the expectation of quiet primary healing. e.g. surgical incisions, cuts from glass and knife.

B) Untidy wounds:

Untidy wounds result from crushing, tearing, avulsion, vascular injury or burns and contain devitalized tissues. They must not be sutured primarily, or else wound healing is unlikely to occur without complications like wound dehiscence, infection, delayed healing or gas gangrene. Management in these wounds is excision or debridement of devitalized tissue to create a tidy wound. Once it becomes tidy, it is safe to close and allowed to heal by secondary intention.

2. **Traumatic classification:**

A) Closed wounds:

- Bruise/ Contusion
- Haematoma

i) Bruise/ Contusion:

It is due to blunt instrument resulting in extravasation of blood in the subcutaneous tissues but the overlying skin or mucosa is intact. There is bluish discoloration known as bruise or echymosis.

ii) Haematoma:

This is a localized collection of blood in the soft tissue. Initially it is fluid, but clots within minutes or hours. After a few days the haematoma will again liquify. A haematoma is usually reabsorbed but can also get infected. It can be evacuated by open surgery or aspirated by a large bore needle.

B) Open wounds:.

i) Incised wounds:

Caused by sharp objects, edges of the wound are sharp. Tends to gape and bleed freely.

ii) Lacerated wounds:

Caused by blunt objects, edges of the wound are jagged. Causes minimal bleeding because of crushing.

iii) Penetrating wounds (variation of punctured wound):

Stab injuries of abdomen are notorious, depth is more.

iv) Crushed wounds:

Caused by blunt trauma.

v) Abrasions:

Caused by scraping away of superficial skin layer and is very painful.

vi) Perforating wounds:

Caused by bullet or projectile or knife, entering the body and emerging from opposite side.

Wound Infection:

The development of wound infection depends on the complex interplay of many factors. If the integrity and protective function of the skin is breached, large quantities of different cell types will enter the wound and

initiate an inflammatory response. This may be characterized by classical signs of redness, pain, swelling, raised temperature and fever. The potential for infection depends on the patient's variables such as the state of hydration, nutrition and existing medical condition as well as extrinsic factor. e.g. related to pre/ intra / post operative care if the patient has undergone surgery. This often makes it difficult to predict which wound will become infected. Consequently, prevention of wound infection should be a primary management objective for all health care practitioners.

Definition:

The wound that drains purulent materials with bacteria identified on culture or all wounds draining pus, whether or not microbiological studies are positive is said to be infected.

The common terms used for wound infection are:

- **Wound contamination:**

The presence of microorganisms within a wound without any host reaction.

- **Wound colonization:**

The presence of microorganisms within the wound which multiply or initiate a host reaction.

- **Critical colonization:**

Multiplication of microorganisms causing a delay in wound healing, usually associated with an exacerbation of pain not previously reported but still with no overt host reaction.

- **Wound infection:**

The multiplication of microorganisms in tissue with an associated host reaction.

Diagnosis:

The host responses that diagnose the wound infections comprise cellulitis, abnormal discharge, delayed healing, change in pain, abnormal granulation tissue, bridging, and abnormal colour, odour etc.

Potential wound pathogens:

The majority of microorganisms are less than 0.1 mm in diameter and can therefore only be seen under a microscope. They can be categorized into different groups such as bacteria, fungi, protozoa and virus depending on their structures and metabolic capabilities.

1. Bacteria:

These are relatively simple cells that can be further categorized according to difference in their shape and cell wall. Cocci (spherical shaped cells), bacilli (rods) and sphirocheats (spirals) can be arranged singly, however cocci and bacilli can be found in pairs, chains and irregular clusters.

- **Gram-positive cocci:**

eg. Beta haemolytic streptococci (streptococcus pyogenes), Enterococci (enterococcus faecals), Staphylococci (Staphylococcus aureus/ MRSA).

- **Gram-negative aerobic rods:**

eg. Pseudomonas aureginosa.

- **Gram-negative facultative rods:**

eg. Enterobacter species, Escherichia coli, Klebsiella species, Proteus species.

- **Anaerobes:**

eg. Bacteriodes, Clostridium.

2. Fungi:

They are composed of larger more complex cells than bacteria. They are either single – celled yeasts or multi-cellular organisms with a nucleus contained within a cell membrane. Fungi can be responsible for superficial infections of the skin, nails, hair e.g. Yeasts (Candida), Aspergillus.

3. Protozoa:

These are single- celled organisms within a fragile membrane and without a cell wall. They are most significantly associated with infected skin ulcers.

4. Viruses:

These are composed of genetic material (nucleic acid) enclosed within a protein coat or a membranous envelope. Although viruses do not generally cause wound infection, bacteria can infect skin lesions formed during certain viral diseases.

The different microorganisms can exist in polymicrobial communities and this

is often the cause within the margins of a wound.

Clinical features contaminated wound:

(a) The patient will suffer generalized illness, and throbbing pain with swelling.

(b) The body temperature is elevated and bacteraemia with rigors may occur.

(c) Local signs of inflammation.

Mode of wound contamination:

There are number of ways by which the wound gets contaminated;

- Direct contact: Transfer from equipment or the hands of carriers.
- Airborne dispersal: Microorganisms deposited from the surrounding air.
- Self contamination: Physical migration from the patient's skin or gastrointestinal tract. Although, there is no definitive evidence to identify the most common route of entry for microorganisms into a wound, direct contact and poor hand washing techniques of healthcare practitioners during pre and post operative phases of patient care are also significant factors.

Factors in relation to infection rates in surgical wounds:

- Presence of an existing chronic infection.
- Time interval between skin preparation and surgery.
- Nature of invasive procedure especially in involving the bowel.
- Extent of tissue loss/ trauma to tissue during surgery.
- Adequacy of wound drainage.
- Appropriate use of wound management materials.
- Poor application of the principles of asepsis at the time of wound dressing changes.
- Presence of devitalized tissue within the wound margin necrotic tissue or slough, particularly if over 50%.
- Nature and prolonged presence of exudates not managed by a closed wound drainage system.

Pathogenic effect of virulent micro organisms:

The development of an infection will be influenced mainly by the virulence of organisms and immunological status of the patient. For example, patients considered to be at the most risk are those being treated with long-term steroids and those receiving chemotherapy. Virulence describes both the pathogenicity and invasiveness of the relevant micro-organisms.

Some species of micro-organisms such as the exotoxins of staphylococcus and streptococcus produce super-antigens.

Super-antigen release within the blood stream that initiates an uncontrolled proliferation of T-cells, stimulates the T-cell subsets allowing the release of cytokines that initiate cell and tissue damage.

Biofilms are the microbial colony encased in an adhesive polysaccharide matrix that is usually attached to a wound surface. Biofilms present in the form of a transparent sticky film covering wound surface. Cell in biofilms exhibit a decreased sensitivity to host immunological defence mechanisms, decreased susceptibility to antimicrobial agents and increased virulence. They have also implicated in persistent infections.

Wound healing:

The wound healing is the process of replacement of lost tissue caused by an insult to the body leading to a break in the skin or tissue. It is a succession of cellular events which are coordinated by the release and recognition of soluble mediators.

Wound healing can be accomplished in one of the following ways:

- **Healing by first intention (primary union):**

This is seen in clean and uninfected wounds, surgically incised wounds, wounds without much loss of cells and tissues. In this case the edges of the wounds are approximated by surgical sutures. This is one type in which healing occurs with minimum scarring.

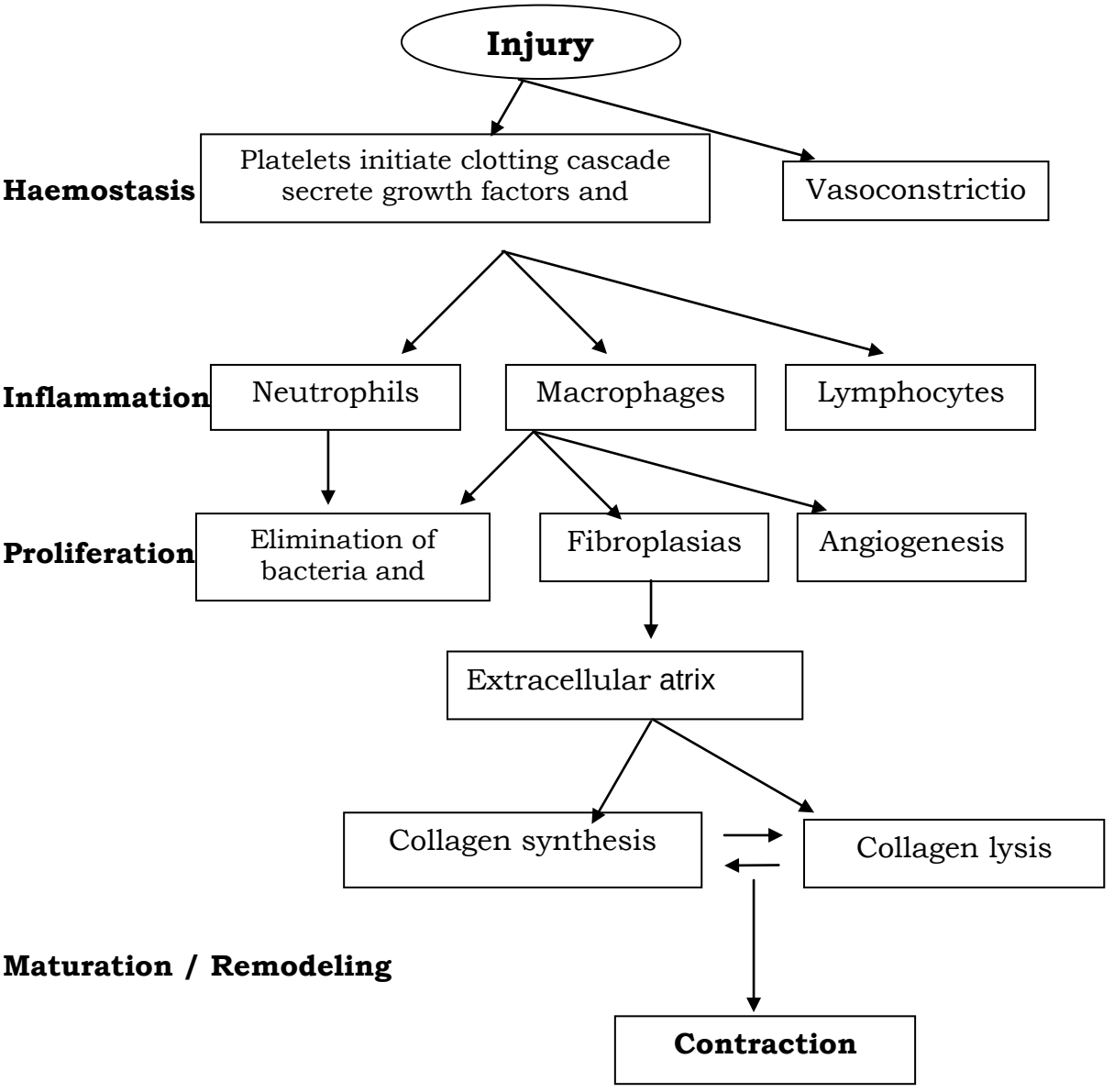
- **Healing by second intention (secondary union):**

This is seen in open wounds with a large tissue defect at times infected and in wounds having extreme loss of cells and tissues. Here the wound is not approximated by surgical sutures but is left open. This is the type in which the wound heals with more scar tissue and takes a longer time to heal.

- **Healing by tertiary intention (Delayed primary closure):**

A wound that is known to be infected is treated first with repeated debridement and systemic or topical antibiotics. When it is assessed as ready for closure by surgical intervention, suturing or skin graft placement is performed.

PHASES OF WOUND HEALING: Chart No.1



All three phases may occur simultaneously, or phase with their individual processes may overlap.

A) Inflammatory phase:

Immediately after injury the body's defences are aimed at limiting the amount of blood loss, tissue damage, and preventing further injury.

The inflammatory phase is triggered by two classes of mediators:

- Those controlling vessel permeability and,
- Those attracting or trapping cells.

The clinical signs of inflammation are caused by changes in blood vessels with dilatation leading to erythema and endothelial cell separation allowing plasma extravasation producing localized swelling. There are overlapping stages but in general, the order of arrival of cells at the wound site from an intravascular space is thought to occur in the following sequence: first platelets, then neutrophils, followed by monocytes and lymphocytes. The migration of epithelial cells to resurface the injured tissue begins during this phase. In this phase mainly there are two events, those are haemostasis and inflammation.

i) Haemostasis:

The damage that occurs to the blood vessels during tissue injury causes disruption of the endothelium. The exposure of collagen promotes platelet aggregation as platelets bind to these proteins. As the platelets become activated it produces thrombin. The thrombin itself in turn activates platelets and serves as a catalyst for the formation of fibrinogen into fibrin. The fibrin strands trap red cells, form a clot, and seal the wound. Inflammatory cells, fibroblasts, thromboxane A2 and prostaglandin F2α are formed from degradation of cell membranes. The fibrin framework also assists platelet aggregation and vasoconstriction. All these activities serve to limit the amount of injury and blood loss.

ii) Inflammation:

This event starts immediately and lasts for 2-5 days. Tissue damage releases chemical mediators called cytokines (eg, transforming growth factor (TGF), platelet derived growth factor (PDGF), insulin-like growth factor (IGF) which initiates a complex interrelated process, causes haemostasis and begins the healing process. Platelets aggregate to stem bleeding and also release other vasoconstrictors and activate the coagulation cascade. The result is conversion of fibrinogen into fibrin, which stabilizes and platelet plug.

At that point, prostaglandins and serotonin does vasodilatation and increase capillary permeability, by which plasma leaks into the tissue

surrounding wound area and is called inflammatory exudate.

Monocytes and neutrophils are attracted to the site of injury. Neutrophils trap and kill bacteria, while monocytes become activated macrophages which produce growth factors and cytokines and scavenge nonviable tissue and bacteria.

Clinical aspects of Inflammation:

- **Redness (rubor):**

This is due to dilatation of small blood vessels within the damaged area. An acutely inflamed tissue appears red.

- **Heat (calor):**

It is due to increased blood flow (hyperaemia) through the region, resulting in vascular dilatation and the delivery of warm blood to the area. Systemic fever results from some of the chemical mediators of inflammation.

- **Swelling (tumor):**

This occurs due to accumulation of fluid exudates in the extra vascular space, to a lesser extent from fluid but more from the physical mass of the inflammatory cells migrating into the area.

- **Pain (dolor):**

It results from the stretching and distortion of tissues due to inflammatory oedema and, in particular from pus under pressure in an abscess cavity. Some of the chemical mediators of acute inflammation, including bradykinin, the prostaglandins and serotonin, are known to induce pain.

- **Loss of function: (Functio laesa)**

Movement of an inflamed area is consciously and reflexly inhibited by pain, while severe swelling may physically immobilize the tissue.

Process of Inflammation

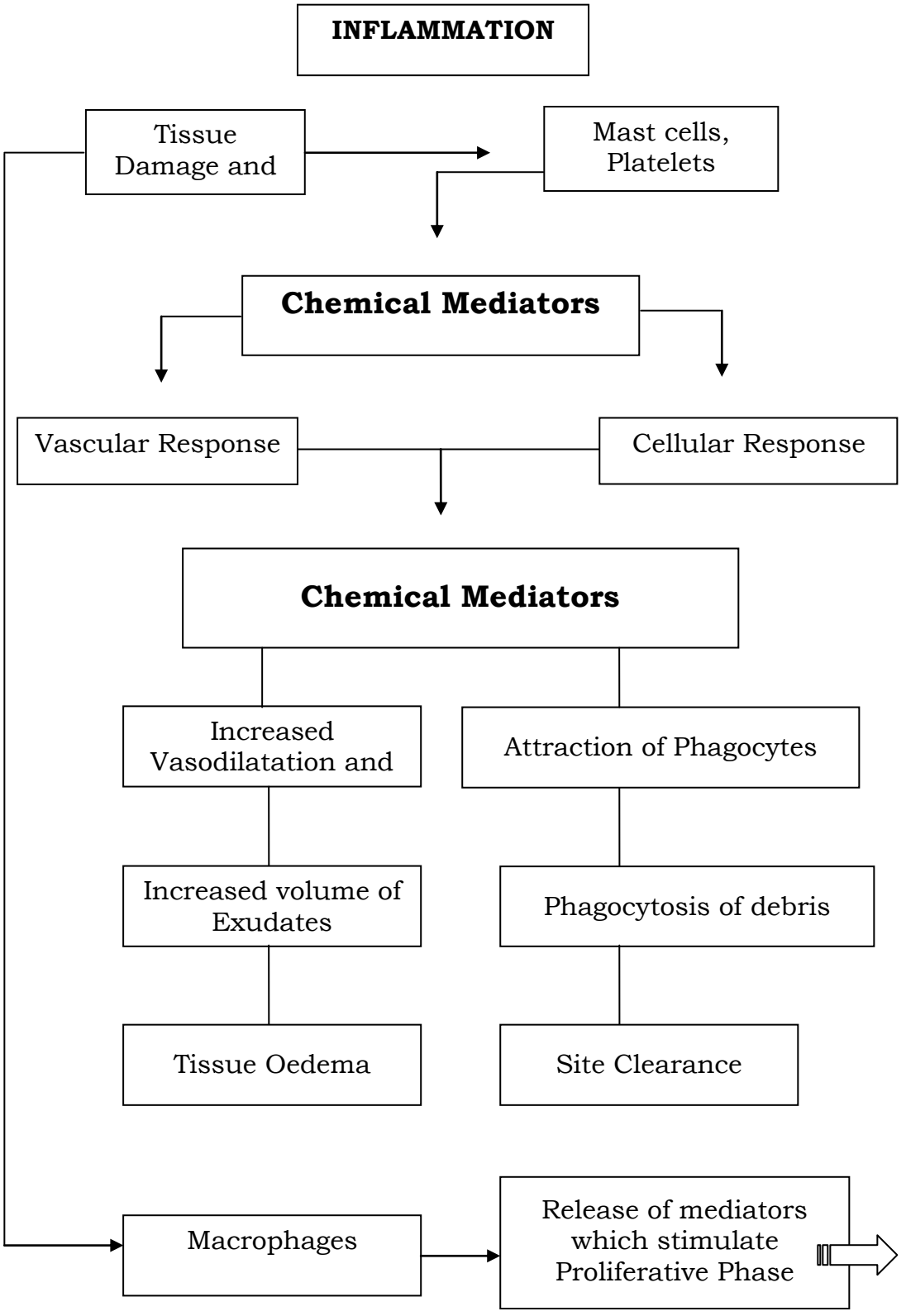


Table - 10

Cytokines that Affect Wound Healing

Cytokine	Cell of Origin	Function
PGDF	Platelets Macrophages Endothelial cells	Cell chemotaxis, Mitogenic for fibroblasts, Stimulates angiogenesis Stimulates wound contraction
TGF-alpha	Macrophages T-lymphocytes Keratinocytes	Mitogenic for keratinocytes and fibroblasts Stimulates keratinocyte migration
TGF-beta	Platelets, T lymphocytes Macrophages	Cell chemotaxis stimulates angiogenesis and fibroplasia
EGF	Platelets Macrophages	Mitogenic for keratinocytes and fibroblasts Stimulates keratinocyte migration
Fibroblast growth factor	Macrophages Mast cells	Chemotactic and mitogenic for fibroblasts and keratinocytes, Stimulates angiogenesis
Keratinocyte growth factor	Fibroblasts	Stimulates keratinocyte migration, differentiation and proliferation
TNF	Macrophages Mast cells T-lymphocytes	Activate macrophages Mitogenic for fibroblasts Stimulates angiogenesis
Interleukin (IL)- 1, IL-2, IL-6, and IL8	Macrophages Mast cells Lymphocytes	Activate granulocytes and endothelial cells, and stimulates hematopoiesis, B and T-cells, and lymphokine, and induces fever, enhances
INFs (IFN-alpha, -beta, and -delta)	Lymphocytes Fibroblasts	Activate macrophages Inhibit fibroblast proliferation
Thromboxane A2	Destroyed wound Cells	Potent vasoconstrictor

Proliferative phase:

This is the reparative process with re-epithelialization, matrix synthesis, and neovascularisation to relieve the ischaemia.

This phase lasts for 2 days to 3 weeks. Macrophages recruit fibroblasts. These cells create a network of collagen fibres. As an acute response to injury haemostasis and inflammation begin to resolve and scaffolding is made for repair of the wound. Central to this phase are the repair processes viz. angiogenesis and fibroplasia, and thus epithelialization takes place normally. This stage is characterized by the formation of granulation tissue consisting of a capillary bed, fibroblasts, macro-phages, a loose arrangement of collagen, fibronectin and hyluronic acid.

During granulation, fibroblasts create a collagen bed to fill the defect and grow new capillaries to supply adequate amount of blood. During epithelialisation, new epithelium migrates from the intact epidermis around the wound. This process requires a moist surface.

i) Angiogenesis:

Hypoxia following injury acts as a major stimulus for angiogenesis which is required for restoration of blood flow. Along with fibroblast proliferation, neo-vascularization is a common feature of granulation tissue in the early phase of healing. One stimulus for new vessel growth is fibroblast growth factor, while other angiogenic factors secreted by macrophages also contribute to the neo-vascularization.

The basement membrane itself is probably degraded by activated endothelial cells. Migrating endothelial cells divide and form a tubule or lumen. Eventually, basement membrane is deposited and forms new capillary. Angiogenesis is very important where differences in regional vascularity and healing are directly related.

ii) Fibroblasts:

In the initial phase after wounding, fibroblasts migrate into the wound site 24 hours after injury. During this phase of healing (4 to 21 days), the fibroblasts are activated and undergo proliferative and synthetic activity, initially producing high amount of fibronectin and then synthesizing other protein components of the extracellular matrix including collagen, elastin and glycosaminoglycans. The fibroblasts align themselves along the wound axis and form cell to cell links which contribute to the contraction of the wound. During contraction, myofibroblasts pull the wound edges closer together to decrease its size.

iii) Epithelialisation:

The epidermis seals the wound to prevent fluid loss and protects against bacterial invasion. Epithelium has tight cell junctions that make this tissue impermeable and a basement membrane zone that gives structural support and attachment between the epidermis and the dermis. *Migration* and *mitosis* are two major phenomena in the process of epitheialisation.

Marginal basal cells loose their firm attachment to the underlying dermis, enlarge and begin to *migrate* into the wound. The fixed basal cells in a zone near the wound edge undergo rapid mitotic divisions (*proliferate*) and the daughter cells migrate, i.e. cells tumble over the top in leap frog fashion by a process called epiboly.

C) Remodeling phase:

This is the period where collagen cross-linking, shrinking, scar contracture and a reduction of oedema takes place naturally.

All wounds contract at the time of maturation and the normal surrounding tissue is pulled into the area of wound, reducing the amount of disorganized scar that eventually must remain. At this phase, acute and chronic inflammatory cells diminish gradually, angiogenesis ceases and fibroplasia ends. Equilibrium between collagen synthesis and collagen

degradation begins gradually. An organized form of collagen gradually replaces the immature, soft, gelatinous collagen. The effect is to increase the tensile strength of the healed wound, but it is < 80% as strong as the original tissue.

Granulation Tissues:

It is the proliferation of new capillaries and fibroblasts intermingled with RBCs and WBCs thin fibrin over it.

1) Healthy granulation tissue:

It occurs in healing ulcer and has sloping edges, bleeds well and has serous discharge. The five P's of granulation tissues are:

a) Pink
b) Punctate haemorrhages
c) Pulseful,
d) Painless
e) Pinhead granulation.

It takes skin grafting well.

2) Unhealthy granulation tissue:

It seems pale with purulent discharge with a floor covered with slough, inflamed and oedematous edge and spreading type of ulcer.

3) Hyper / exuberant granulation tissue:

Here granulation tissue protrudes out of the ulcer bed.

4) Pyogenic granuloma:

It is a granulation tissue of an infected wound/ ulcer bed which bleeds on touch.

Granulation tissue formation:

The haematoma within the wound is soon replaced by granulation tissue, which consists of a loose matrix of fibrin, fibronectin, collagen, glycosaminoglycans, particularly hyaluronic acid, containing macrophages, fibroblasts and in-growing blood vessels.

Three phase of granulation:

a) Phase of inflammation:

After trauma, blood clots at the site of injury. There is acute inflammatory response with exudation of plasma, neutrophils and monocytes within 24 hours.

b) Phase of clearance:

A combination of proteolytic enzymes liberated from neutrophils, autolytic enzymes from dead tissue cells and phagocytic activity of macrophages clear off the necrotic tissue debris and red blood cells.

c) Phase of in-growth of granulation:

This phase consists of 2 main processes:

i) Angiogenesis (Neovascularization):

Formation of new blood vessels at the site of an injury takes place by the proliferation for the endothelial cells from the margin of the severed blood vessels. Initially, the proliferated endothelial cells are solid buds but within a few hours they develop a lumen and start carrying blood. The newly formed blood vessels are leak, accounting for the oedematous appearance of the new granulation tissue. These blood vessels differentiate into muscular arterioles, thin walled veinules and true capillaries.

The process of agenesis is stimulated with proteolytic destruction of basement membrane and takes place under the influence of the following factors;

a) Vascular endothelial growth factor (VEGF) elaborated by mesenchymal cells but its receptors are present in endothelial cells only,

b) Platelet derived growth factor (PDGF),

c) Transforming growth factor - B (TGF-B)

d) Basic fibroblast growth factor (BFGF)

e) Other cytokines and surface antigens.

ii) Fibrogenesis:

The newly formed blood vessels are present in an amorphous ground substance or matrix. The new fibroblast originates from fibrocytes as well as by mitotic division of fibroblasts. Some of these fibroblasts have a combination of morphologic and functional characteristics of smooth muscle cells (myofibroblasts). Collagen fibrils begin to appear by about the 6th day. As the maturation proceeds, more and more of collagen is formed while the number of active fibroblasts and new blood vessels decrease. This result in the formation of inactive looking scar called 'cicaterisation.'

Factors affecting granulation tissue formation:

1. Cortisone administration:

Excess corticosteroid administration inhibits granulation tissue formation. The fibroblasts remain small with little collagen formation. This effect is well observed in experimental animals, but corticosteroid is normal dosage may not influence wound healing in human beings.

2. Scurvy:

In this condition, though vascular granulation tissue is formed, yet there is a failure of collagen formation. Instead, there are thick reticulin fibres. Maturation of collagen does not occur in the absence of vitamin C.

3. Protein starvation:

This too causes delayed formation of collagen and results in the excessive accumulation of poorly-sulphated ground substance.

Tensile Strength of wound:

The strength of a healing wound is of great practical importance to the surgeon. It acts as the main safeguard against wound dehiscence. Experimentally, it may be estimated by measuring the force necessary to disrupt the wound. In the first few days, the strength of a wound is only that of the clot which cements the cut surfaces together.

Later on, various changes take place in the wound healing process and at the end the tensile strength of the wound corresponds to the increase in amount of collagen present.

Factors influencing the tensile strength of the wound:

1) Direction of the wound:

Skin wounds parallel to the lines of Langer heal faster, whereas skin incisions made across Langer's lines tend to gape and their healing is delayed. Tensile strength of the wound becomes more when this is parallel to the lines of Langer. Hence, the transverse abdominal incisions produce strong scar than the longitudinal ones.

2) Pull of underlying muscles:

The wound which are parallel to the pull of the underlying muscles constitute a strong scar.

3) Previous wound:

Resutured wounds heal faster than those sutured primarily, as the repairative process has already commenced.

4) Abdominal binders:

Reduce the rate of gain in strength.

Signs and symptoms of wound healing:

- Swelling

- Stiffness
- Tenderness
- Discoloration
- Skin tightness
- Itching and scar formation.

Healing process in wounds and specialized tissues:

- **Acute wounds:**

Sequence is completed in a continuous and expected time frame. It is usually achieved with few or no complications. Over - action in acute wound healing leads to keloids, hypertrophic scars etc.

- **Chronic wounds:**

Failure or delay of healing components may be due to lack of responsiveness to normal growth regulatory signals associated with regular trauma, poor perfusion, excessive inflammation and systemic diseases.

- **Healing of specialized tissue:**

Regeneration also occurs in the alimentary tract. When a mass of muscle tissue is damaged repair by scarring occurs. Regeneration does not occur in the central nervous system, but can occur in the peripheral nerves. Bone fragments too will be reunited by regeneration in case of fractures.

ULCER

Etymology of Ulcer:

The word ulcer is derived from old French ***ulcer*** and from Latin ***ulcus,*** which means **discontinuity** or **break.**

Definition of Ulcer:

An ulcer is a break in the continuity of the covering epithelium, either following molecular death of the surface epithelium or its traumatic removal.

Ulcers are the non-healing wounds that develop on the skin, mucous membrane, eye etc. Although they have many causes, they are marked by loss of integrity of the area, generalized weakness of the patient and a lengthy healing time.

Classification of Ulcers:

Ulcers can be classified clinically and pathologically.

A) Clinical classification:

1) Spreading ulcer: No granulation tissue, plenty of discharge, excessive slough, surrounding area inflamed and oedematous with purulent smell.

2) Healing ulcer: Red granulation tissue, minimal serous discharge, slough absent, minimal signs of inflammation and smell absent.

3) Callous ulcer: Pale granulation tissue, serous discharge and slough present, indurations at base and surrounding area, smell present.

B) PATHOLOGICAL CLASSIFICATION:

1) Non-specific ulcers:

These are further classified as,

a) Traumatic ulcer:

It occurs due to trauma in the areas where skin is closely applied to only prominence viz. shin, malleoli, and back of the heel. It is circular, small

in size and painful. e.g. Foot baller's ulcer, plaster sores, dental ulcer of tongue.

Its occurrence may be due to the following trauma.

i) Mechanical: eg. Dental ulcer of tongue from jagged tooth.

ii) Physical: eg. From electrical / X-ray burn.

iii) Chemical: eg. From application of caustics.

b) Infective ulcer :

These are due to secondary infection of wounds by pyogenic organisms like staphylococcus, streptococcus, etc. the predisposing factors are anaemia or poor nutritional status.

They are in the form of multiple, small, red, scabbed sores on leg or ankle.

c) Arterial ulcer/ Ischaemic ulcer:

These are due to peripheral arterial diseases and poor peripheral circulation. The condition is more often seen in older people and has evidence of trauma and infection of the destroyed skin over a limited area of the leg or the foot.

Such ulcers tend to occur on the anterior and outer aspects of the leg, dorsum of the foot, on the toes or the heel. Pain is the main complaint with punched out edge and floor that may expose the tendons.

d) Venous ulcers:

It occurs due to abnormal venous hypertension in the lower third of the leg, ankle and dorsum of foot and may be associated with demonstrable varicose veins. Such ulceration may follow thrombosis and phlebitis in deep and perforating veins.

Venous ulcers are most common on inner side, just above the medial malleolus of the leg. These ulcers are ovoid in shape, usually single in number with irregular, thin blue margin and pale granulation tissue in the floor. Pigmentation is seen in the vicinity of ulcer.

These ulcers are usually shallow and never penetrate the deep fascia and are slightly painful in the beginning but gradually the pain settles down. The base is fixed to deeper structures associated with seropurulent discharge and occasional traces of blood.

e) Neurogenic / Neuropathic / Trophic/ Penetrating ulcers:

They occur due to the impairment of the nutrition of tissues, inadequate blood supply and neurological deficit or repeated trauma to the insensitive part of the body.

They are commonly seen on the heel and ball of the foot when patient is ambulatory and on buttocks or back of heel when patient is non-ambulatory. The edge is punched out, base is slightly indurate and floor is covered with slough. The surrounding skin has no sensation and they are painless. (eg. Bed sore, perforating ulcers.)

f) Martorell's ulcer:

It occurs in patients who are usually Hypertensive / Atherosclerotic.

g) Cryopathic ulcer:

These results from intense cold and chilly weather.

h) Tropical Ulcer:

The characteristic feature of this ulcer is callousness towards healing. The edge is slightly raised and exudes copious serosang discharge. Pain is an important symptom. In some cases, it destroys the surrounding tissue and spreads widely.

i) Diabetic ulcer:

In this, slight injury to the glucose laden tissue may cause chronic infection and ulcer formation. Ulceration in diabetes may be precipitated by ischaemia due to diabetic atherosclerosis, infection or peripheral neuritis. When the ulcer is due to neuropathy a tropic ulcer results (features are same as tropic ulcer but surrounding sensation of skin will be less).

When the ulcer is due to ischaemia, ischemic ulcer results but it is less painful than typical arterial ulcer. The toes and feet are normally

affected.

j) Miscellaneous ulcers:

Ulceration of the leg may be associated with gross anaemia, leukaemia, polycythaemia, systemic sclerosis, RA, ulcerative colitis, poliomyelitis, arteriovenous fistula, acholuric jaundice, various collagen disorders, chronic lymph edema, cortisone ulcers etc.

2) Specific ulcers:

a) Tuberculous ulcer:

Such an ulcer usually develops due to bursting of cold abscess; from matted tuberculous lymph node or TB of bone or joint and from sub-mucous lesions e.g. intestinal TB.

It is oval in shape, generally with irregular crescentic border, often multiple in number with a thin reddish-blue, undermined edge and slightly indurated base. It is usually shallow, accompanied with slight pain, shows a variable amount of discharge and its floor is covered with pale granulation tissue.

b) Syphilitic ulcer:

Ulcers due to syphilis are seen in all 3 stages.

Primary →	Hard chancre is seen (external genitalia) Single, painless, indurated base, oval/round in shape with raised hyperaemic margin.
Secondary →	Ulcer may develop in the form of mucous patches, or in form of condylomas which are raised, white, flat and have hypertrophied epithelium.
Tertiary →	Typical lesion in this stage is localized gumma or gummatous ulcer seen over sub cutaneous bones, in the scrotum characterized by Punched out indolent edge and yellowish gummatous tissue.

c) Soft Chancre/ Chancroid (Ducrey's) Ulcer:

It is a contagious disease caused by Gram -ve Haemophilus ducryeyi. 3 to 5 days after exposure multiple acute sores develop on external genitalia. These are often painful, gradually become pustular and ulcerate to form soft sores. These are multiple, soft, rounded, painful, bleed readily and the edges are undermined.

d) Actinomycosis:

This condition causes multiple ulcers. At first, the area becomes indurated, nodules appear which soften and later ulcerate in various places. The surrounding skin often looks bluish in colour. It discharges yellow coloured sulphur granules.

e) Meleny's ulcer:

It occurs in post-operative wounds and is commonly seen over the abdomen, thorax, etc. It is very painful with signs of toxaemia. It has undermined edges, foul smelling granulation tissue and seropurulent discharge.

3) Malignant Ulcer:

a) Rodent ulcer/ Basal cell carcinoma :

It is a locally invasive carcinoma of the basal layer of epidermis. It is of low grade malignancy and is commonly seen on the face, above the line from the corner of the mouth to the ear, the inner canthus of the eye, the nose, on and around naso-labial fold. It has a raised and pearly-white beaded edge, irregular shape and its floor is covered with coat of dried serum and epithelial cells.

b) Epithelioma / Squamous cell carcinoma:

This occurs commonly on the dorsum of hands, or on the face, limbs, lips, vulva, penis etc. It has normal temperature and is usually not tender, oval or circular in shape with raised and everted edge, indurated base and its floor is covered by necrotic tumour, serum and blood.

c) Marjolins Ulcer:

It is the name given to a squamous cell carcinoma which arises in a chronic benign ulcer or scar. It is a slow growing malignant lesion, painless and the edge is not always raised and averted.

PHASES OF AN ULCER FORMATION:

An ulcer shows 3 stages during its formation.

1) Stage of Extension:

- Floor- covered with exudate and slough and has no granulation tissue,
- Discharge-often purulent even blood stained.
- Edges-sharply defined, thickened and inflamed.
- Surrounding area-inflamed and oedematous.
- Base- indurated and fixed.
- Slough and small amount of discharge may dry to become scab.
- Layer of dead tissue may become dehydrated and form a dark brown eschar.

2) Stage of Transition:

- This prepares the ulcer for healing.
- Floor becomes cleaner with slough separating. Small reddish areas of granulation tissue appear which link ultimately to cover whole surface.
- Discharge becomes more serous.
- Base shows diminishing induration.

3) Stage of Repair:

- Ulcer may show signs of healing or characters of callous stage in this phase.

a) Signs of healing :

- Floor - contains smooth and even red granulation tissue covered by a single layer of epithelium. Granulation tissue is transformed to fibrous tissue which contracts to form a scar.

- Edge - shows more shelving with the bluish epithelium gradually extending from the margin onto the floor of the ulcer to cover it up.
- Discharge - merely serous.
- Surrounding skin- soft, flexible, free from congestion.
- Base - free from fixity.

b) Change to indolent / callous ulcer :

- This means the ulcer refuses to heal by itself.
- Floor-covered with unhealthy pale granulation tissue.
- Edge - thickened, oedematous, indurated and often discolored.
- Surrounding area- oedematous and indurated.
- Based-indurated.

Stages of ulcer formation:

- **Stage 1:** The skin is red, underlying tissue is soft and redness disappear with minor pressure.
- **Stage 2:** There is redness, swelling and hardening of the skin around the area. Sometimes there is blistering or loss of the superficial skin.
- **Stage 3:** The skin becomes necrotic. There may be exposure of the fat beneath the skin or the skin may be lost through all its layers.
- **Stage 4:** There is more loss of fat and more necrosis of the skin right through to the muscle beneath.
- **Stage 5:** Continuing loss of fat and necrosis of muscle below.
- **Stage 6**: Bone destruction begins with irritation of the bone, erosion of the bone cortex progressing to osteomyelitis. There may be sepsis of a joint, pathologic fracture or generalized body infection, septicaemia.

Management of ulcer:

The main aim of ulcer management is to ensure the quickest and most durable form of healing with a minimal scar.

- **Local:**

  - Adequate rest
  - Adequate immobilization
  - Elevation of the part

- Protection from repeated trauma
- Dressings
- Debridement
- Topical agents.

- **Systemic:**
  - Analgesic
  - Anti inflammatory
  - Supportive eg. good diet.
- **Specific:**
  - Antibiotics for infection;
  - Specific antibiotics for TB, syphilis, etc;
  - Specific drugs for fungal infections;
  - Antidiabetic therapy for DM;
  - Surgery,
  - Radiotherapy
  - Chemotherapy for malignancy.

Treatment of Different Types of Ulcers:

It can be dealt under the following headings.

1. Treatment of spreading ulcers:

After obtaining pus culture and sensitivity report, antibiotics are given. Many solutions are available to treat the slough like H_2O_2 or Eusol.

2. Treatment of healing ulcers:

Regular dressings are done for a few days with antiseptic creams like liquid iodine, Zinc oxide or Silver Sulphadiazine preparation. A swab is taken to rule out the presence of Streptococcus haemolyticus which is a contra-indication for skin grafting.

If the ulcer is small, it heals by itself with epithelialisation from the cut edge of ulcer. If the ulcer is large, free split skin graft is applied as early as possible.

3. Treatment of chronic ulcers:

These do not respond to conventional methods of treatment. Some special forms of treatment are available but their usefulness is doubtful. They are Infrared radiation, Short-wave therapy, UV - rays to decrease the size of ulcer, Amnion helps in epithelialization, Chorion helps in granulation tissue, etc.

4. Treatment of non-specific ulcers:

Any underlying cause is treated eg: varicose veins, diabetes arterial disease. Many lotions and nonadhesive applications are used to aid the separation of sloughs, hasten granulation and stimulate epithelialisation. Hypochlorite solution and 0.5% $AgNO_3$ is popular in the earlier stages and later 1% Zinc sulphate solution. Ointments and creams used include Zinc oxide and 1% hydrocortisone. Excessive granulation needs to be discouraged by excision, curettage or by the application of caustics such as Silvernitrate.

Wound dressings:

- **Primary dressing:** One placed directly on wound.
- **Secondary dressing:** One placed on primary dressing.

Wound debridement:

The process of removal of dead necrotic tissue or foreign material from and around a wound to expose healthy tissue is called *debridement.* It can be performed under general anaesthesia, local anaesthesia, or even bed side.

Types of debridement:

1) Surgical debridement:

This is done in wounds with a large amount of necrotic tissue.

2) Mechanical debridement:

Application of moistened saline gauze is done in this type and allowed to dry and harden and then removed with devitalized tissue attached. It is a form of non-selective debridement and is done in wounds with moderate

amount of necrotic debris. Hydrotherapy, Saline irrigation and Saline moistened gauze are included under this.

3) Autolytic debridement:

It uses the body's own enzymes and moisture to rehydrate, soften and liquify the slough. It is achieved with hydro colloids, hydro gels and transparent films.

4) Chemical debridement: Chemical desloughing agents like Hydrogen peroxide, Povidone iodine etc. are used.

5) Biological debridement:

Maggot debridement therapy is an old remedy that has been revised and proven to be invaluable in cleansing non-healing wounds. This simple procedure involves the placement using restrictive dressing of live disinfected maggots into non-healing wounds to promote the cleansing of necrotic tissue and initiation of the healing process.

6) Topical antibiotics:

This is the local application of antibiotics.

7) Enzymatic debridement:

A variety of enzymatic agents have been developed to debride necrotic and sloughy wounds without damaging healthy tissue. These include collagenase, collagen from krill and combination of streptokinase and streptodpornase These can be applied directly to the wound bed or are injected into or under any devitalized tissue. However, it is expensive.

Advances in wound healing:

- Growth factor therapy.
- Matrix replacement.
- Modulation of tissue enzymes.
- Stem cell therapy.
- Gene therapy.
- Bioengineered skin.

A variety of many other treatment modalities have been suggested including electro-magnetic stimulation, lasers and ultrasound.

Factors affecting quality of healing:

Successful wound healing is not necessarily the acceleration of closure or the degree of tensile strength but the appearance of the resultant scar.

A) Systemic factors:

- Peripheral vascular disease viz. Arterial, Venous and Microcirculation.
- General malnutrition viz Protein, Vitamins.
- Chemotherapy
- Radiotherapy
- Metabolic disorders viz. Diabetic mellitus, Rheumatoid arthritis etc.
- Immunosuppressant drugs and corticosteroids.
- Anticoagulants.
- Age
- Obesity.
- Mental status.
- Life style.
- Systemic shock, leading to impaired oxygenation of tissues.
- Infection that potentiates collagen lysis.
- Excessive tension on wound edges that interferes with wound healing because of local oxygen deficit leading to tissue ischaemia and necrosis.
- Another wound i.e. competition between several healing areas for the substrates required for wound healing impairs wound healing at all sites.
- Low temperature i.e. relatively low tissue temperature in the distal aspects of the upper and lower extremities (a reduction of 1-1.5^{0}C [2-3^0] from normal core body temperature) is responsible for slower healing of wounds at these sites.
- Hypoxia i.e.inadequate tissue oxygenation due to local vasoconstriction resulting from sympathetic over-activity may occur

because of blood volume deficit, unrelieved pain, or hypothermia, especially involving the distal end of the extremities.

- Other condition may delay or hamper healing viz. Uraemia, Jaundice, Anaemia, Cytotoxic drugs and Malignant diseases.

B) Local factors:

- **Position of skin wound:** The skin wounds parallel to the lines of Langer heal faster, due to arrangements of collagen bundles in the dermis. The wounds at right angle to these lines tend to gape and the healing is delayed.
- **Blood Supply:** Wounds in the pre-tibial region, wounds of the leg with varicose veins or on ischaemic limbs take much more time to heal than those in the face which are well vascularised.
- **Infection:** Due to infection, fibroblasts have to compete with inflammatory cells and bacteria for oxygen and nutrients. So proper granulation tissue and collagen formation are affected, which is necessary for wound healing.
- **Movement:** Delicate capillary loops of the granulation tissue and the delicate epithelium are damaged due to movement. Frequent change of dressing also has the same adverse effect and should be avoided. Movement also causes easy entry of infection.
- **Exposure to ionizing radiation:** Previous X-irradiation may affect vascularity of the part, and it inhibits wound contraction.
- **Foreign bodies:** These include tissue reaction and inflammation. If sutures are kept for longer period, it may cause aseptic abscess.
- **Adhesions to bony surfaces:** They cause delay in wound healing by preventing proper wound contraction. eg. wound over the tibial region.
- **Necrosis:** This obviously retards wound healing.
- **Lymph drainage:** Impairment of lymph drainage thus causing oedema of the part.

- **Faulty technique of wound closure:** This too is obviously responsible for delay in wound healing.

Complication of wound healing:

- Implantation cysts - due to inflammation of implanted epithelial cells in the wound after healing.
- Ugly and painful scars.
- Hypertrophied scars and Keloid formation.
- Neoplasia - Rarely in case of burns.
- Contracture - due to an exaggeration of wound contraction.
- Deficient scar formation - due to inadequate formation of granulation tissue.
- Pigmentation of skin as some coloured material is left in the wound and may impart colour to the healed wound.
- Marjolin's Ulcer.
- Incisional hernia at a weak scar, especially after laparotomy.

Drug Review

DRUG REVIEW-*DARUHARIDRA* (दारूहरिद्रा):

- **Latin name:** *Berberis aristata* DC.
- **Family:** *Berbiridaceae.*
- **Habitat:** Berbery bushes grow in the Nilgiris and all over the temperate Himalayas from Bhutan to Kunawer.
- **3 Species:** a) *Berberis asiatica*
  b) *Berberis lyceum*
  c) *Berberis chitria*
- **Parts Used:** Stem, extract, fruit, root, bark, wood etc.
- **Constituents:** 1. Berberine (C20 H19 NO5)
  2. Oxy-acanthine
  3. Berbemine
  4. Palmatine
  5. Berberrubine

Roots and wood are rich in a yellow alkaloid berberine, a bitter substance that dissolves in acids. Root contains two more alkaloids. Fruit contains Malik, Tartaric and Citric acids.

- **Action:** Tonic, stomachic, astringent, diaphoretic, antipyretic, and root are purgative.
  - Rasanjana: prepared by boiling the bark in Sheep milk rich in alkaloid.
  - Externally the decoction is used as a wash for unhealthy ulcers to improve their appearance and promote cicatrisation. (Databased on Medicinal plants used in Ayurveda, vol.1 page 121 CCRAS)

Synonyms (पर्यायनाम) and their meanings:

- पीतदु . . . पीतो दुः स्कन्धो ऽस्य । (having yellow bark)
- कालेयक . . . कालयति दोषान् कालयिकाः । (removes all vitiated doshas)
- हरिद्रवः . . . हरि पिङ्ग पीतो वा दुः अस्य ।
- दार्वी . . . दीर्यते . . .दृ विदारणे ।

DARUHARIDRA (*Berberisaristata*)

- पचंपचा . . . १. अत्यर्थ पचति इति ।

  २. परं पालकं स्वास्थ्यं जनयति वा इति ।

  (Maintains good health)

- कंटकटेरी . . .कटतिआवृणोति स्त्रोतोमार्गान इति कटः उग्र ः दोषविशेषः । तमपि कटति आवृणोति इति ।

(Controls the powerful vitiated *Dosha*, which is causing dysfunction of *Srotasa*)

- *Parvatiya Haridra*.
- *Daruharidra*: wood yellow coloured as haridra.
- *Darupita*
- *Darunisha*
- *Kashtarajani*
- *Peetchandan*
- *Parjanya*: It protects *Pramehi Rugnas* or reduces *Ushnata*.
- *Parjani*
- *Kapitak*: Which makes water yellow coloured.
- *Kantkateri*: It reduces *Srotorodha*; having *kantak* (thorns).

Vernacular Names:

1. Hindi ⟶ Daruhaldar kashmal
2. Gujarathi ⟶ Daruhaldar
3. Punjabi ⟶ Jonsar
4. Tamil ⟶ Marpanjal
5. Telugu ⟶ Kasturi pappu
6. English ⟶ Indian Berbery

- दार्वी कुटजवत् पत्रैः अंकोलीसदृशी गिरौ ।

  क्षीरिणी सा भवेत् तस्याः क्वाथेन रसांजनम् ॥

  भा. प्र.

- ***Gana*:**
  - ***Charak*:** *Lekhaneeya, Kandughna, Arshoghna.*
  - ***Sushrut:*** *Haridradi, Mustadi, Lakshadi.*

- **Properties and Uses:**

Rasa	*Tikta, Kashaya*
Virya	*Ushna*
Vipak	*Katu*
Guna	*Laghu, Ruksha, Vishada*

Due to its *Tikta* and *Kashaya Rasa* it acts as *Shamak* (*Pachan* of *Doshas*) *Rakta Shodhak*, *Twak Doshahara*. It acts as *Kaphghna* due to its *Katu Vipak* whereas due to its *Ruksha* and *Laghu Guna* it acts as *Lekhaneeya.*

तिक्ता दारूहरिद्रा स्याद् रूक्षोष्णा व्रणमेहनुत् ।
कर्णनेत्रमुखोदभूतां रूजां कण्डुश्च नाशयेत् ॥

ध.नि.

तिक्ता दारूहरिद्रा तु कटुष्णा व्रणमेहनुत् ।
कण्डुविसर्पत्वग्दोष विषकर्णाक्षिमेहनुत् ॥

राजनिघण्टु

ऊष्णं रसायनं तिक्तं छेदनं व्रणदोषहृत् ॥

भावप्रकाश

चंदन ..... दारूहरिद्रामुस्तानीति दशेमानि
कण्डुघ्नानि नाशयेत ॥

च. सू.४

Karma:

हरिद्राद्वाय यष्टयाह्वकलशी कुटजोद्भवाः ।

..... मेदः कफाढय पवनस्तन्यदोषनिबर्हणौ ॥

अ. हृ. १५/३५,३६

मुस्तकुष्ठहरिद्रादारूहरिद्रा वचा..... इति दशेमानि

लेखनीयानि भवन्ति ॥

च.सू . ४/३

कासीसे सैन्धव ..... रजनीद्वये ।

शोधनांगेषु चान्येषु चूर्ण कुर्वीत शोधनम् ॥

सु. सू. ३७/२0

..... हरिद्राद्वायनिम्ब ..... ।

कषायतिक्तमधुरः कफापित्तार्तिनाशनः ॥

कुष्ठाकिमिहरश्चैव दुष्टव्रणविशोधनाः ॥

सु. सू. ३९/ ६४,६५

***Rogaghnata*:**

1. ***DushtaVrana***, *medoja Vrana*
2. *Krimi* (Helminthiasis)
3. *Kushtha*
4. *Kandu* (pruritus)
5. *Visarpa*
6. Skin diseases
7. E N T diseases
8. Diabetes mellitus
9. *Shopha*.

It is bactericidal and astringent, so used in chronic ulcer for healing. Experiments on rats have shown that *Daruharidra* is useful for wound healing. Its ointment is useful for pimples and boils.

MADHU (मधु)

- **Zoological name:** *Mel.*
- **Class:** *Hymenopetra.*
- **Vernacular names:** Marathi: Madh

  Hindi: Shahad, Madhu

  English: Honey
- **Synonyms:** *Madhu, Kshaudra, Makshik, Saradyam.*
- ***Nirukti*:** मन्यते एतम् इति मधु ।
- **Pharmacodynamics:**

  Rasa - *Madhur*

  Anurasa - *Kashay*

  Guna - *Laghu, Ruksha, Sukshma, Yogvah*

  Vipaka - *Katu.*

  Virya - *Ushna.*

  Prabhav - *Kaphaghna.*
- ***Karma:***

Agnideepana, Varnya, Swarya, Lekhana, Hrudya, Vajikara, Sandhana, ***Shodhana****, Ropana, Sangrahi, Chakshushya, Prasadana, Sukshmamarganusari*

- ***Doshkarma:***

Tridoshashamana, Kaphaghna by *Laghu Guna, Vatapittaghna* by *Madhur Kashaya* and *Pichhil Guna.*

- ***Rogaghnata*:**

1) *Hikkashwaskasaghna,*
2) Atisar,
3) Chhardi,
4) Trishna,
5) Krimivishashamana,
6) Prameha,
7) Kandu,
8) Arsha,
9) Kamala,
10) Galaroga,
11) Glani,
12) Mada,
13) Daha,
14) Malbandha,
15) Dhatugamitwa
16) Srotovishodhnam,
17) Medhakara.

REFERENCES OF *MADHU*:

१) वातलं गुरू शीतं च रक्तपित्तकफापहम् ।
सन्धानं छेदनं रूक्षं कषायं मधुरं मधु ॥
च. सु २७

२) मधु शीतं लघु स्वादु रूक्षं ग्राहि विलेपनम् ।
चक्षुष्य दीपनं स्वर्य **व्रण शोधन** रोपण ॥ १ ॥
सौकुमार्यकारं सुक्ष्मं परं स्त्रोतोविशोधनम् ।
कषायानुरसं ल्हादि प्रसादजनकं परम् ॥ २ ॥
वर्ण्य मेधाकर वृष्य विशदं रोचनं हरेत् ।

कुष्ठार्श कास पित्तास्र कफ मेह क्लम कृमीन् ॥ ३ ॥

मेद तृष्णा..... विड्ग्रहान् ।

दाह..... योग्बाहुल्पवतलम् ॥ ४ ॥

भा. नि.

३) **व्रणसंधानरोपणं** वातलं मधु ।

वाग्भट

४) मधु तु मधुरं कषायानुरसं रूक्षं शीतमग्निदीपनं

वर्ण्यं स्वर्यं लघु सुकुमारं लेखनं हृदयं वाजीकरणं

सन्धानं शोधनं रोपणं संग्राहि चक्षुष्यं प्रसाधनं

सूक्ष्ममार्गानुसारिपित्तश्लेष्ममेदोमेह हिक्काश्वासकासातिसार

च्छर्दि तृष्णाकृमिविषप्रशमनं ह्लदि त्रिदोषप्रशमनं चः तत्तु लघुत्वा

त्कफघ्नं पैच्छिल्यान्माधुर्यात् कषायभावाच्च वातपित्तघ्नम् ॥

सु.सू.४५/१३२

५) मधु स्वादुरसंशीतं व्रणशोधनरोपणं ॥

६) कषायानुरसं रूक्ष बल्य दीपनलेखनम् ॥

संधानंलघुचक्षुष्यंस्वर्यंहृद्यंत्रिदोषनुत्

श्वासहिक्काविषहरमुष्णखाम्बुनिरोधि च ॥

द्रव्यसंग्रह

TYPES OF HONEY

Ayurvedic Types:

- ***Makshik:*** *Pingat Varna*, prepared by big honey bees, best in all types.
  - ***Gunakarma:*** *Netraroga, Kamala, Arsha, Kshata, Shwasa, Kasa, Kshayahara* and can be easily digested.
- ***Bhramar*:** Prepared by relatively small honey bees and looks like shining stone.

- ***Gunakarma:*** *Raktapittanashaka.*

- ***Kshaudra*:** Prepared by small honeybees named as *Kshaudra*
  - ***Gunakarma:*** *Pramehanashaka.*
- ***Peetik*:** Prepared by honeybees, which look like mosquito, black in colour and their bites cause pain. Honey looks like *Ghrit.*
  - ***Gunakarma:*** *Ruksha, Ushna, Daha-Raktavikara Nashaka.Vidaha, Prameha-Mutrakruchranashaka, Vranaropaka.*
- ***Chatra*:** Honey prepared by grey and yellow colour honeybees found in Himalayas.
  - ***Gunakarma:*** *Kriminashak, Shwetakushtha-Raktapitta, Prameha- Shrama and Moha-nashaka.*
- ***Ardhya*:** Honey prepared by Yellow coloured, sharp-mouthed honeybees is *Ardhya.*
  - ***Gunakarma:*** *Netrya, kaphpittahara.*
- ***Auddalak*:** Honeybees which are grey and yellow coloured & looks like insects are *Auddalak.*
  - ***Gunakarma:*** *Katuvipaki, pittakara, ruchikar, swarya, kashaya* and *amla rasatmaka.*
- ***Dala*:** This type of honeybee gathers honey from flowers.
  - ***Gunakarma:*** *Madhura-Amla-Kashaya Rasatmak, Ruksha* and *Kaphakara, Ruchikaraka, Snigdha, Chhardi* and *Prameha Nashak.*

TYPES ACCORDING TO *KALA*

- ***Ama:*** Honey recently brought by honeybees is said to be '*ama' madhu* and is *Tyajya.*
- ***Pakwa*:** Honey stored in honeycomb till it gets *Pakwavastha* is *Madhyam.*
- ***Nava:*** *Pakwa* honey recently brought from honeycomb is *Madhyam.*
- ***Juna*:** Is *Uttam* and is *Pakwa* honey after one year.

- ***Kwathit*:** Is honey with *Mala* after cooking on *Jalasweda* and pure.It is *Sadharan*.

Types of Honeybees

- Apies dorsata fabr. (Rock- bee)
- Apies florac fabr. (Indian live bee)
- Apies florae fabr. (Little bee)
- Melipona or Trigona species (Dammar bee)

Chemical composition of *Madhu*

- Glucose - 84.9%
- Sucrose - 02.69%
- Water - 10.03%
- Formic acid - 01.9%
- Nitrogen - 01.29%
- Salts - 00.12%
- Specific gravity - 01.36
- Gond - 00.7%
- Ash - 00.1%
- Vitamin B & C are also present in *Madhu*.

Lakshanas* of good *Madhu

- *Madhu* dips in water
- Honeybee can't be traped in good *Madhu*.
- Dog never eats *Uttam Madhu*.
- On anupright cloth, good *Madhu* travels directly and straight towards ground.
- *Uttam Madhu* burn like oil
- After doing *Anjana* of good *Madhu* its *Tikshanatwa* is felt in the eyes.

Parikshana* of *Madhu

- ***Swarup*:** Water bubbles present in *Madhu* look dot-like.

- ***Shabda:*** During burning there is no noise and it burns smoothly.
- ***Sparsha*:** *Madhu* liquifies in contact with heat, so if we hold it in between two fingers it liquefies.
- ***Rasa:*** *Madhura.*
- ***Anurasa:*** *Kashaya.*
- ***Gandha*:** During burning there is no foul smell.
- ***Varna*:** It looks like *Goghrit*, which is *Pingat* and *Oshat.*

IMPURITIES IN *MADHU*

***Sahaj* (Natural):**

Wax, salivation, excreted products of honeybees.

These are natural & unavoidable impurities present in *Madhu.*

***Kritrim* (Artificial):**

Sharkara, guda, Kakavi gul like artificial impurities may be found.

मधु संदधति " मधुश्लेष्मपित्तप्रशमनानाम् ॥ च . सू . २७

बृंहणीयं मधु नवं नातिश्लेष्महरं सरम् ।

मेद: स्थौल्यापहं ग्राहि पुराणमतिलेखनम् ॥ १४0 ॥

दोषत्रयहरं पक्वामामम्लं त्रिदोषकृत् ॥ १४१ ॥

तद्युक्तं विविधैर्योगैर्निहन्यादामयान् बहून् ।

नाना द्रव्यात्मकत्वाच्च योगवाहि परं मधू ॥ सु . सू . ४५/१४२

SOURCE:

Honeycomb where honeybee deposits it. It occurs in the nectarines of flowers from where it is sucked by the bees and then stored up in the comb. The finest honey is the virgin honey, which drain itself from the comb and that which is freshly produced from the hive. Honey sold in the bazaars is derived from the honeycomb of the several species of wild bees.

CONSTITUENTS:

- Grape-sugar or dextrose which becomes crystalline
- Fruit-sugar or laevulose which remains liquid
- Wax • Volatile oil • Proteins • Mucilage • Colouring matter • Formic Acid and
- Ash (rich in carbohydrates.)

Some of the substances contained are pollen dust, ethereal oil, various phosphates, lime (calcium) and iron. Most of the elements found in the human body are present in honey in small proportions. The dextrose and laevulose present in it are monosaccharides and are absorbed easily. As regards vitamin contents, it is stated that honey contains both the fat-soluble and water-soluble principles. Honey contains a special protein secreted by bees. It contains a diastatic ferment similar to that of saliva and having the power of converting starch into sugar. In short, chemically, honey is mainly a mixture of dextrose and laevulose.

ACTION*:*

New honey is considered demulcent and laxative. Honey more than a year old is astringent, emollient and laxative. The fatty acids present in honey stimulate peristalsis and digestion. Honey in moderate doses has a beneficial effect on the digestion and appetite of those with weak stomach and loose bowels. It's value lies in providing a readily absorbable food. It is the most potent fuel to provide energy for muscles and consequently most valuable for that all-important, most vital muscle, the heart, which knows no complete physical rest. Lime in honey is wonderful in regulating the secretions of internal glandular organs, being equally good for persons of both sexes, irrespective of age from infancy to old age. It has hypotonic action in bringing sound sleep if taken with cold water before going to bed. Babies generally fall a sleep after taking honey. It decreases flatulence, increases general metabolism and also the quantity of urine among children. Locally applied, it stimulates the muscle surfaces, in an atonic condition. It also acts as styptic. A special protein secreted by the bees contained in

honey, when inoculated into rabbits causes the formation of antibodies in the serum.

USES:

Honey is much used in the preparation of confections and as an adjunct to decoction, pills and powder. In malnutrition, pneumonia, heart weakness, curing rickets, marasmus, scurvy and other conditions. In old age, honey is especially useful in providing energy to the body. It dries the phlegm and clears the system of mucous, which are the two weaknesses that man generally falls victim to in old age. The use of honey internally and of sunlight externally, to the body has been eulogized as an ideal remedy to regulate the secretions of internal glands and calcium metabolism. Honey mixed with *Daruharidra*, applied to infected wounds, burns, ulcers, scalds and heals rapidly.

ACTION OF *MADHU* ON *DUSHTAVRANA*:

Madhu has following properties:

Rasa → *Madhura, Kashaya*

Virya → *Ushna*

Vipak → *Katu*

Prabhav → *Kaphaghna*

We know that *Dushtavrana* is a *Kaphapradhana* disease. Due to *Kaphaghna* property it reduces *Kapha, Kleda* at the same time reducing *Vata* and *Pittadushti*. *Kashaya Anuras* causes *Stambhana* of *Srava*. *Madhu* is *Yogavahi*, so it enhances the action of *Daruharidra*.

Vishada:

यस्य क्षालने शक्ति स विशद:।

हेमाद्रि टिका .

Vishada means cleanliness. It keeps *strotas* clean by destroying *Dosha-Mala* present in it. It also does *Kledashoshana*, thereby reducing *Srava* and thus helps the *Shodhana* of *Dushtavrana*.

***Sukshma*:**

Due to *Sukshma Guna*, drug is easily absorbed which causes *Strotovivarana* and *Sarvasharirgamitwa*. By *Kapha* and *Meda Shodhan*, it helps in controlling the *Sarvadaihik Samprapti*.

Because of *Ushna Virya* it causes *Vilayana* of *Styan* and *Pichhil Srava*. It also has property of *Vranaropana* and is *Krimighna* in nature.

POVIDONE IODINE

Povidone Iodine (PVP-I) is completely soluble in cold water, ethyl alcohol, isopropyl alcohol, polyethylene glycol, and glycerol. Its stability in solution is much greater than that of tincture of iodine or Lugol's solution.

Free iodine, slowly liberated from the Povidone Iodine (PVP-I) complex in solution, kills eukaryotic or prokaryotic cells through iodination of lipids and oxidation of cytoplasmic and membrane compounds. This agent exhibits a broad range of microbicidal activity against bacteria, fungi, protozoa, and viruses. Slow release of iodine from the PVPI complex in solution minimizes iodine toxicity towards mammalian cells. Povidone-iodine applied to an abrasion using a cotton swab.

Following the discovery of iodine by Bernard Courtois in 1811, it has been broadly used for the prevention and treatment of skin infections, and the treatment of wounds. Iodine has been recognized as an effective broad-spectrum bactericide, and it is also effective against yeasts, moulds, fungi, viruses, and protozoa. Drawbacks to its use in the form of aqueous solutions include irritation at the site of application, toxicity and the staining of surrounding tissues. These deficiencies were overcome by the discovery and use of povidone-iodine, in which the iodine is carried in a complexed form and the concentration of free iodine, is very low. The product thus serves as an iodophor. In addition, it has been demonstrated that bacteria do not develop resistance to PVP-I and the sensitization rate to the product is only 0.7% Consequently, PVP-I has found broad application in medicine as a surgical scrub; for pre- and post-operative skin cleansing; for the treatment and prevention of infections in wounds, ulcers, cuts and burns; for the treatment of infections in decubitus ulcers and stasis ulcers; in gynecology for vaginitis associated with candidal, trichomonal or mixed infections. For these purposes PVP-I has been formulated at concentrations of 7.5–10.0% in solution, spray, surgical scrub, ointment, and swab dosage forms. It is

available without a prescription under the generic name povidone-iodine or the brand name Betadine.

NANOTECHNOLOGY:

Recently povidone-iodine has been incorporated into the field of nanotechnology. A wound-healing application has been developed which employs a mat of single wall carbon nanotubes (SWNTs) coated in a monolayer of povidone-iodine. It has been previously shown that the polymer polyvinylpyrrolidone (PVP, povidone) can coil around individual carbon nanotubes to make them water-soluble. This povidone-iodine coated carbon nanotube mat serves an electrically conductive bandage with antiseptics properties. Traditionally povidone-iodine is soaked into absorbant materials for application to wound sites, but this can lead to contact burns if excessive amounts of povidone-iodine are used. Additionally, traditional methods can allow large quantities of povidone-iodine to be released from the bandage material upon contact with fluids at the wound site. Meanwhile, the carbon nanotube supported povidone-iodine is prevented from escaping from the bandage in large amounts, and after an initial release of excess povidone-iodine to the wound site, a secondary slow release of iodine from the carbon nanotube bound povidone takes place. It was first sold in 1955, and has since become the universally preferred iodine disinfectant.

PHARMACODYNAMICS/KINETICS:

Absorption: Topical: Healthy volunteers: Little systemic absorption; Vaginal: Rapid, serum concentrations of total iodine and inorganic iodide are increased significantly.

MECHANISM OF ACTION:

Povidone-iodine is known to be a powerful broad spectrum germicidal agent effective against a wide range of bacteria, viruses, fungi, protozoa and spores.

USE:

External antiseptic with broad microbicidal spectrum against bacteria, fungi, viruses, protozoa and yeasts

DOSAGE:

Topical: Apply as needed for treatment and prevention of susceptible microbial infections

CONTRAINDICATIONS:

Hypersensitivity to iodine or any component of the formulation; pregnancy

WARNINGS/PRECAUTIONS:

Highly toxic if ingested; sodium thiosulfate is the most effective chemical antidote; avoid contact with eyes; use with caution in infants and nursing women

ADVERSE REACTIONS:

1% to 10%:

Dermatologic: Rash, pruritus

Local: Local edema

<1%: Systemic absorption in extensive burns causing iododerma, metabolic acidosis, renal impairment

PATIENT EDUCATION:

Do not swallow; avoid contact with eyes

NURSING IMPLICATIONS:

Avoid contact with eyes

Materials & methods

Materials and Methods

1) Materials:

A. Patient:

- *Selected as per the eligibility criteria.*

B. Drugs / Medications:

- ***Kanda*** of ***DARUHARIDRA*** *(Berberis aristata DC.)* was purchased, authentified, powdered and standardized.
- ***MADHU*** (Honey) was standardized and used in the original form.

C. Miscellaneous:

- Dressing materials viz. NS, cotton pad, bandage etc.

I) Procurement:

Five samples of *Daruharidra (Berberis aristata)* were purchased from different shops of the Pune market. These samples were given to the *Dravyaguna Vigyan* Department of Bharati Vidyapeeth University, College of *Ayurved*, Pune for primary identification based on exomorphic characteristics. The best sample of these was chosen to be sent for authentication to the Department of Botany, Pune University.

II) Authentication: (Annexture II)

Daruharidra *(Berberis aristata*) and ***Madhu*** (Honey) purchased from the Pune market and Central Bee Research Institute, Pune respectively were authentified prior to use by the department of Botany, Pune University.

III) Standardization: (Annexture III)

These authentified samples were standardized in the Late Prin. B.V. Bhide Research Lab Tilak road, Pune. Three samples were standardized separately.

Sample 'A' - *Daruharidra* powder

Sample 'B' - *Madhu*

Sample 'A+B' - Mixture / Trial drug.

IV) Pharmaceutics:

Procedure of preparation of drug:-

The ***kanda*** of ***Daruharidra*** *(Berberis aristata)* was cleaned to remove any foreign matter viz. dust or other adulterants. It was then grinded into a fine powder at the *Rasa-Shastra Bhaishajya Kalpana* Department of Bharati Vidyapeeth University, College of Ayurved, Pune. This powder was then sieved (sieve size = 60) and stored in an air tight container to be used as and when required by mixing with ***Madhu*** (Honey).

Preparation of formulation:

Daruharidra and *Madhu* were mixed as per the requirement in an approximate ratio of 1:2 and used fresh each time.


DARUHARIDRA
{Berberis aristata}
दारुहरिद्रा


Madhu
{Honey}
मध


दारुहरिद्रा + मधु
{Daruharidra+Madhu}

2) Methodology:

a. Type of study: Randomized Controlled Clinical Trial.

b. Place of study:

Bharati Vidyapeeth Medical Foundation's Ayurved Hospital and Research centre, Pune - 411043.

OPD & IPD of *Shalyatantra* department.

c. Ethics Committee approval: (Annexture I)

Approval of Ethics Committee was taken on 01/06/2013 Ref no. BVDUCOA/ EC/187/2013-14

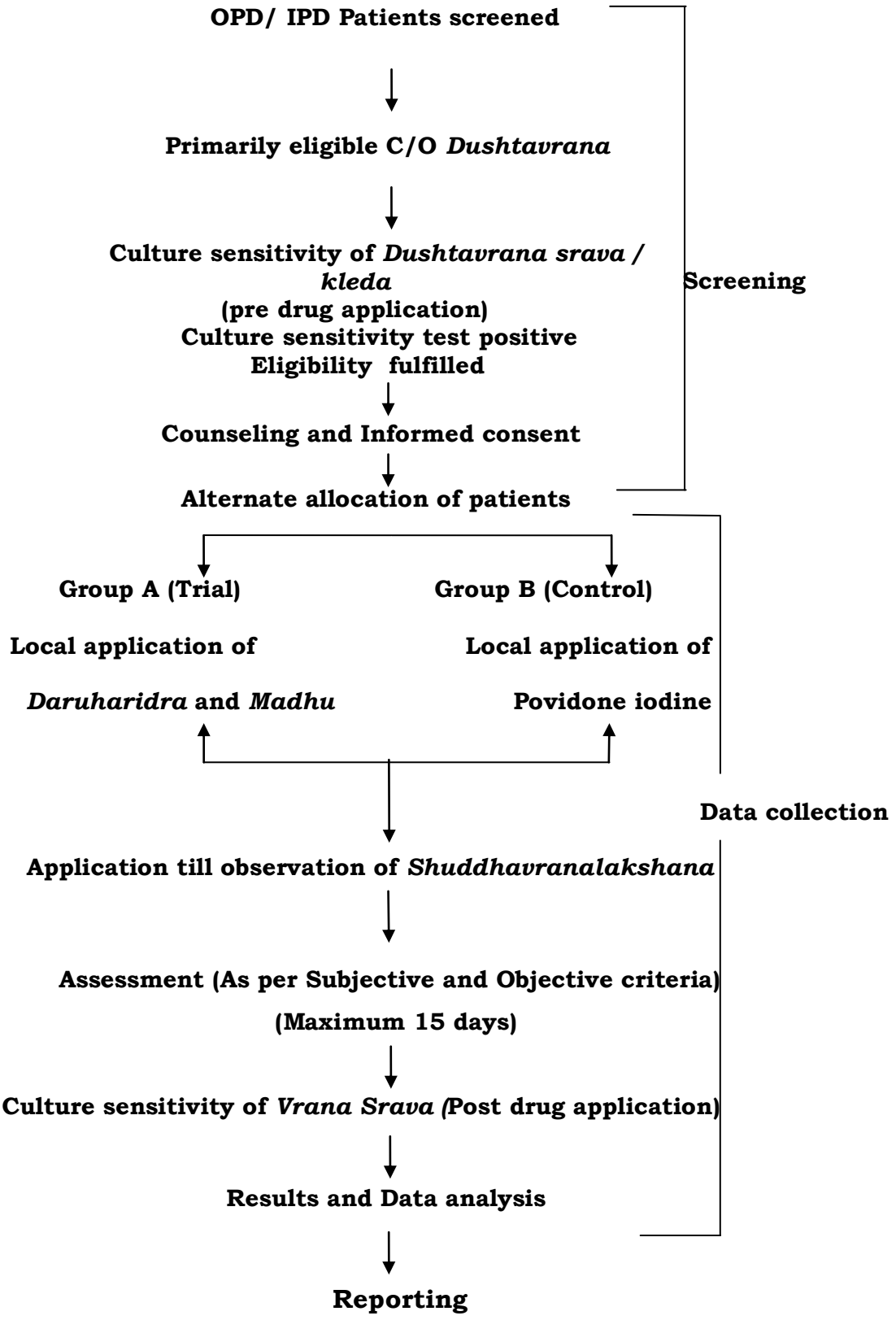
d. Study methodology:

- Randomization technique –Alternate selection of patients after Culture sensitivity is positive.
- Grouping-

  'A' group -Trial group - *Daruharidra* + *Madhu*.

  'B' group - Control group - Povidone iodine.
- 50 patients were studied in each group.

Chart of Study Methodology



3. i) Inclusion criteria:

Patients suffering from any one of the following categories but who do not require systemic anti-microbials were included.

- *Doshadushtijanya* ***DUSHTAVRANA***.
- *Aghataja* ***DUSHTAVRANA.***
- *Shastrakarmottar* (post surgical) ***DUSHTAVRANA***.
- Diabetic wound
- *Dagdha* (burn) ***DUSHTAVRANA*** eg. *Agnidagdha (burn by flame), Rasaynik* (by chemical), Electrical etc.

ii) **Exclusion criteria:**

- *Danshajanit* ***DUSHTAVRANA*** eg. *Dog bite, Snakebite, insect bite* etc.

iii) **Dropout patients:**

- Patients who showed aggravation of symptoms and required systemic anti-microbials medications, those who were irregular in follow- ups, those who failed to follow instructions or those who exited the study for personal reasons were considered as dropouts.

4. Drug Administration :-

Trial drugs, *Daruharidra* and *Madhu* were thoroughly mixed in appropriate ratio i.e. 1:2 as per previous study, taking into consideration the fact that this ratio made an easily applicable *lepa* and rendered good results in *vranashodhan.*

After using NS for cleaning the wound, local application of *lepa* was done once daily to cover entire *vrana* with cotton pad followed by spiral bandaging.

In the Control group, Povidone iodine was used for treatment using the same method as that of Trial drug.

5. Duration of Study :

A selected patient was observed till *Shuddhavrana lakshana* were noted. The period was maximum 15 days.

On an average, calculated on the basis of the efficacy of the same drugs tested in a previous study this duration ranges from 7-10 days.

6. Parameters of Assessment:

- **Subjective parameters-**

  Sushrutokta Shuddhavrana lakshana[6]

  - *Pidikotpatti* - Formation of granulation tissue.
  - *Jivhatalabho* – Pinkish red (resembling colour of tounge)
  - *Avedana* – No pain.
  - *Nirasravo* – No discharge / slough.
  - *Anaraktata* – No redness around the wound.

- Site of wound (Sthana).
- Size of wound (Aakruti)
- Signs of inflammation.viz. rubor, calor, tumor, dolor, loss of function.
- Discharge / exudates of wound.

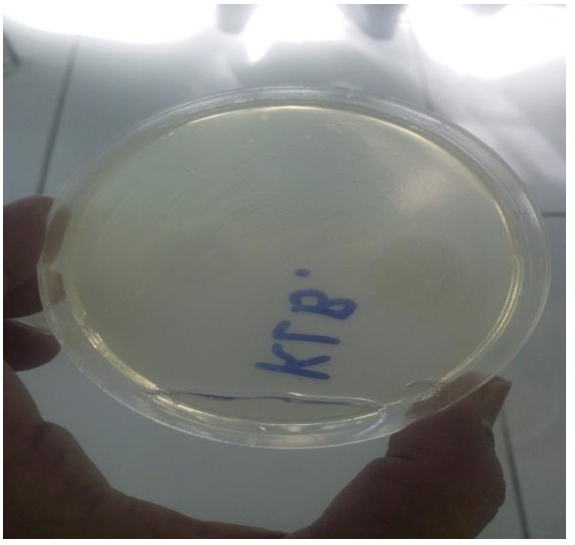
- **Objective Parameters-**

Culture sensitivity (Anextue II), especially of the *Srava* (discharge) / *Kleda* (slough) for micro-organisms

- This test was conducted pre treatment so as to ascertain the presence of various micro-organisms. The water extract of *Daruharidra* with *Madhu* was used for the same. (Annexure V)
- Post treatment Culture sensitivity was also done.

Pseudomonas spp

Klebsiella spp



Staphylococcus aureus

Escherichia coli

7. Gradation scale:-

A 4-point scale was employed on the basis of the CTCAE guidelines of 2009.

Symptoms	Gradation
***Vedana*/ Pain**	0 - No pain 1 - Localized feeling of pain during movement only but not during rest 2 - Localized feeling of pain during rest but not disturbing sleep 3 -Localized feeling of pain continuous, radiating and not relieving by rest
***Gandha*/ Smell**	0 - No smell 1 - Bad smell 2 - Tolerable unpleasant smell 3 - Foul smell which is intolerable
***Varna*/ Colour**	0 - Pinkish red 1 - Slight pinkish red 2 - Slight Whitish/ Yellowish 3 - Whitish/ Yellowish
***Srava* / Discharge**	0 - No discharge/ dry dressing 1 - The gauze is slightly moist 2 - After opening the bandage the gauze is completely wet 3 - The bandage is completely moist within 24 hrs
***Ushma* (*Sthanik*)/ Local Temperature**	0 - No change in local temperature 1 - Slight change in local temperature 2 - Moderate change in local temperature 3 - Severe change in local temperature
***Araktata*/ Redness**	0 - No redness 1 - Slight redness around the wound 2 - Redness around the wound 3 - Marked redness

Primary endpoint-

- Observation of conversion / transformation of *Dushtavrana* into *Shuddhavrana.*[6]

Secondary endpoint-

- Antimicrobial action of *Daruharidra* and *Madhu* as a combination.

3. Investigations:-

These baseline investigations were done as a part of safety parameters and also facilitated inclusion of the patients into the study.

- Culture sensitivity of *Srava/ Kleda* - Pre treatment and Post treatment.
- Haemogram with Erythrocyte Sedimentation Rate (ESR)
- BSL – Fasting and Post Prandial.(F/PP)
- Human Immunodeficiency Virus (HIV)
- Urine – Routine and Microscopic (R/M)

4. Sample Size–

It was calculated considering 7% Prevalence rate of disease at BVMF's *Ayurved* hospital Department of *Shalyatantra.*

$n= z^2 p (1-p)/ d^2$ was **100**

n=Sample size

z = Standard normal variable 1.96

p = Prevalence

d = Error = 0.05

Total number of patients studied was 100, who completed treatment excluding the dropouts.

6. Method of data analysis:

The data collected from the study was compiled, tabulated and analyzed using Wilcoxon Signed Rank test for the efficacy of Trial Drug and Control Drug and Mann Whitney U test for comparison this was in accordance with the aim and objectives of the study.

Observations, Results & Analysis

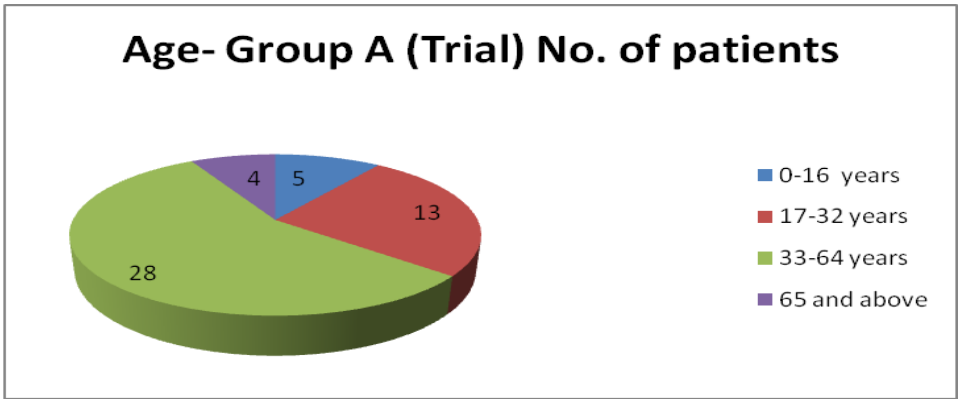
Observations, Results and Analysis

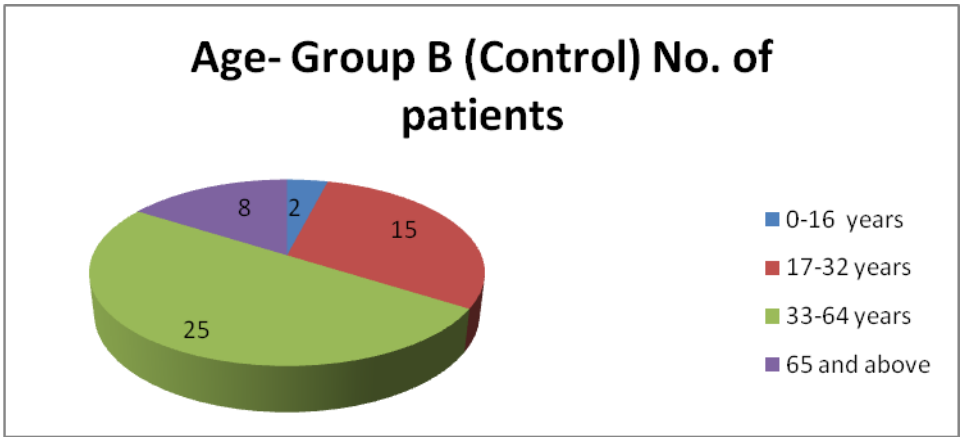
After completing the clinical study, observations, results and analysis were noted. The data was divided into three group's i.e. demographical, clinical and investigative data.

A) Demographical:

a) Age: Total patients – 100

Age Groups	Group A (Trial)		Group B (Control)	
	No. of patients	%	No. of patients	%
0-16 years	05	10%	02	04%
17-32 years	13	26%	15	30%
33-64 years	28	56%	25	50%
65 and above	04	08%	08	16%

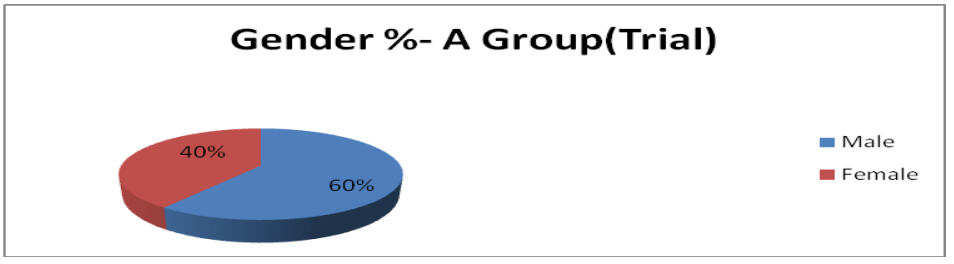


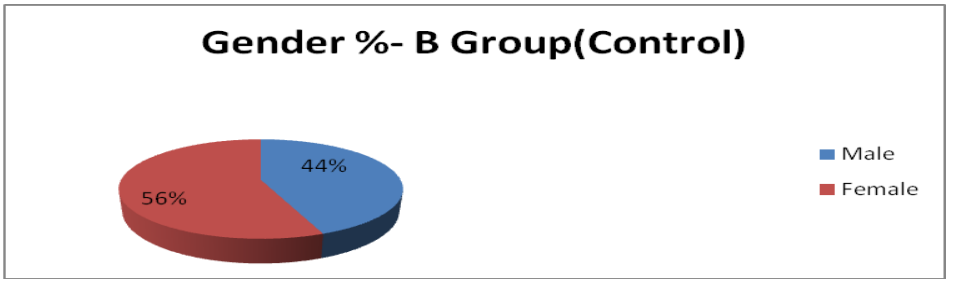


In both groups A and B maximum number of patients were seen in age group 33-64 years i.e.53%, followed by patients in age group17-32 years (28%). Besides, patients of age 65+ and between 0-16 years were 12% and 7% respectively.

b) GENDER : Total patients- 100

Gender	Group A (Trial)		Group B (Control)	
	No. of patients	**%**	**No. of patients**	**%**
Male	**30**	**60%**	**22**	**44%**
Female	20	40%	28	56%



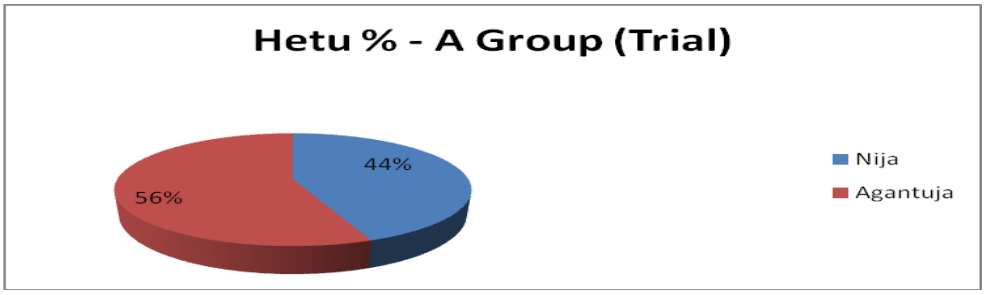


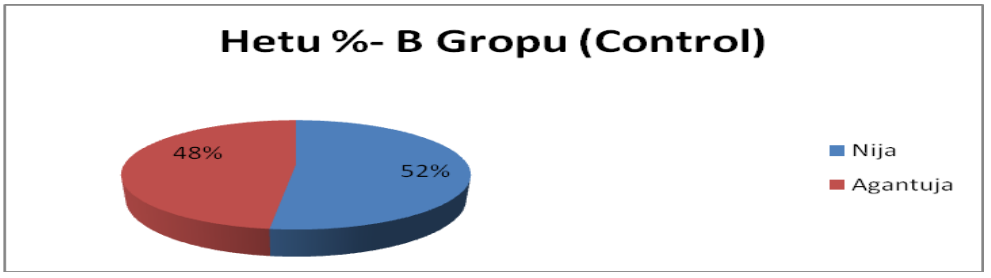
Gender-wise discrimination was noted, though not starkly in both groups i.e. 52% males and 48% females.

B) Clinical:

a) *Hetu*: Total patients- 100

Hetu	Group A (Trial)		Group B (Control)	
	No. of patients	**%**	**No. of patients**	**%**
Nija	22	44%	26	52%
Agantuja	28	56%	24	48%

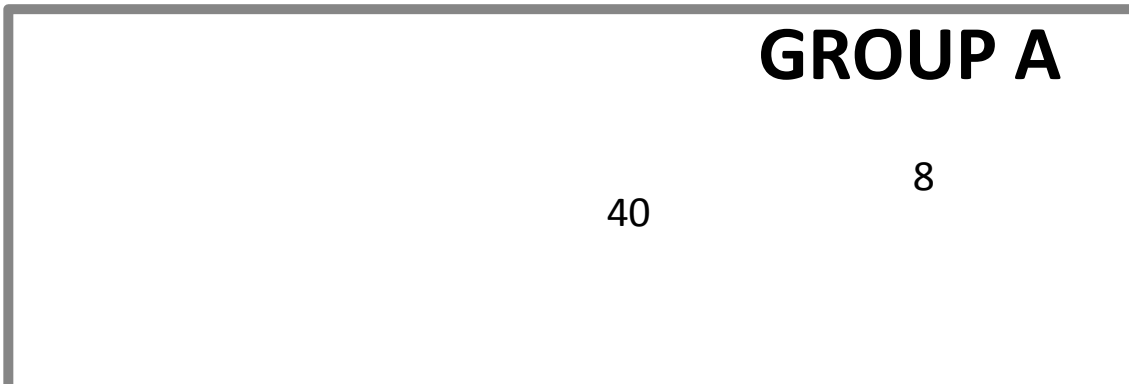


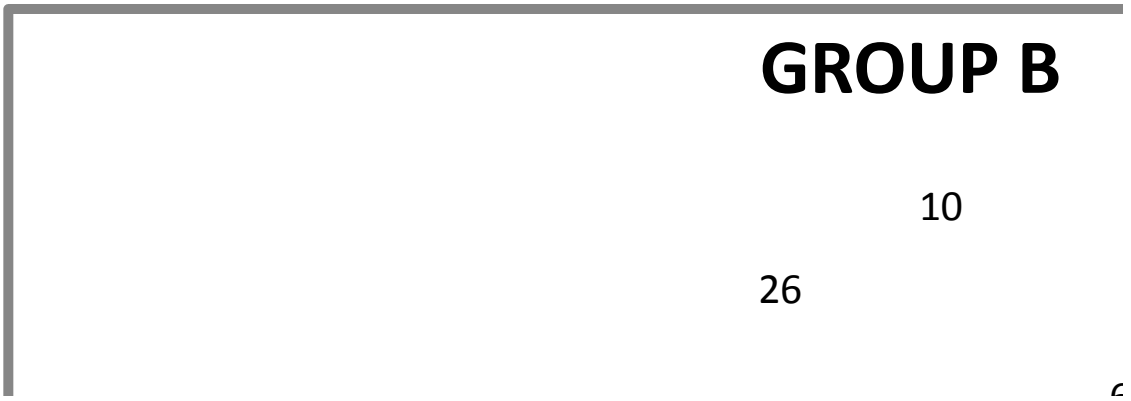


According to observations based on *hetu 'Agantuja'* was predominant with about 52% of the total cases.

***b) Sthana*:** Total patients- 100

Site of *Dushtavrana*	**Group A (Trial)**		**Group B (Control)**	
	No. of patients	**%**	**No. of patients**	**%**
Upper limbs	05	10%	04	08%
Lower limbs	32	64%	26	52%
Other	13	26%	20	40%

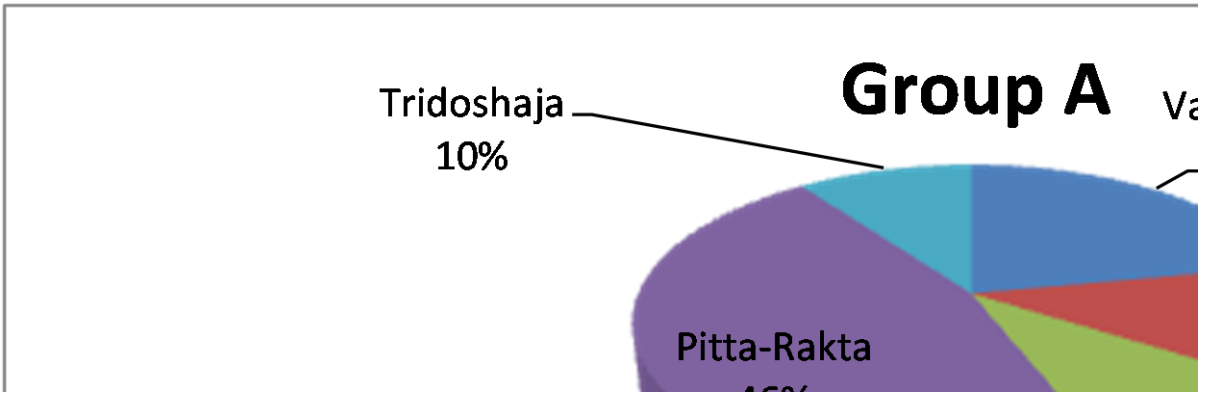


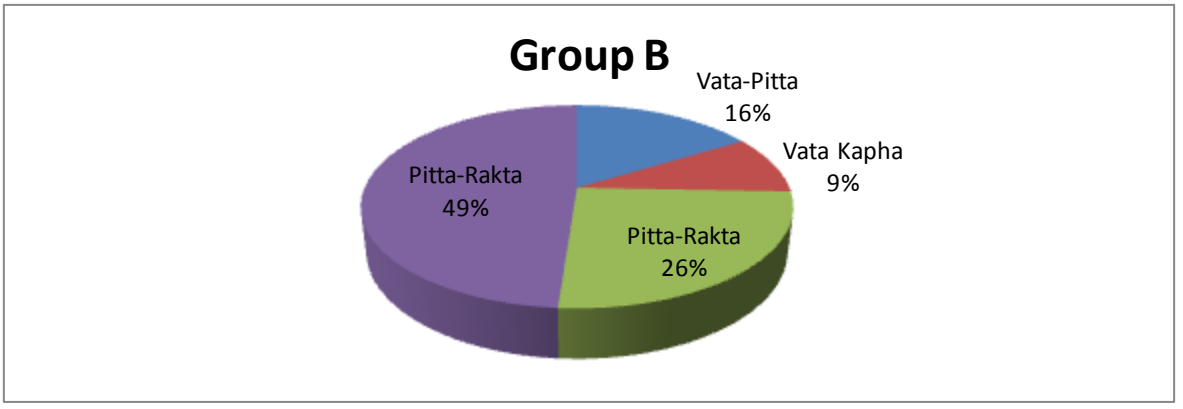


In both groups, maximum patients had v*rana* on lower limbs (32 in group A and 26 in group B). 13 cases from group A and 20 patients from group B had *vrana* on other areas, while 5 and 4 patients had *vrana* on their upper limbs.

c) *Doshadushti*: Total patients- 100

Doshadushti	**Group A (Trial)**		**Group B (Control)**	
	No. of patients	**%**	**No. of patients**	**%**
Vata-Pitta	11	22%	07	14%
Vata-Kapha	06	12%	04	08%
Pitta-Kapha	05	10%	11	22%
Pitta-Rakta	23	46%	21	42%
Tridoshaja	05	10%	07	14%

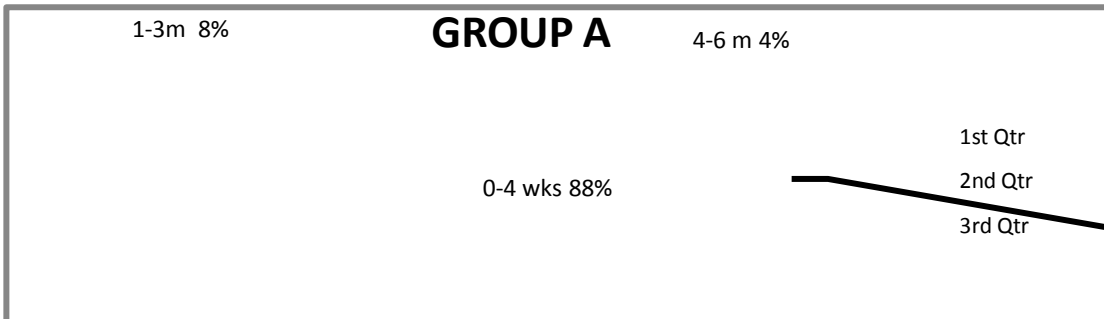


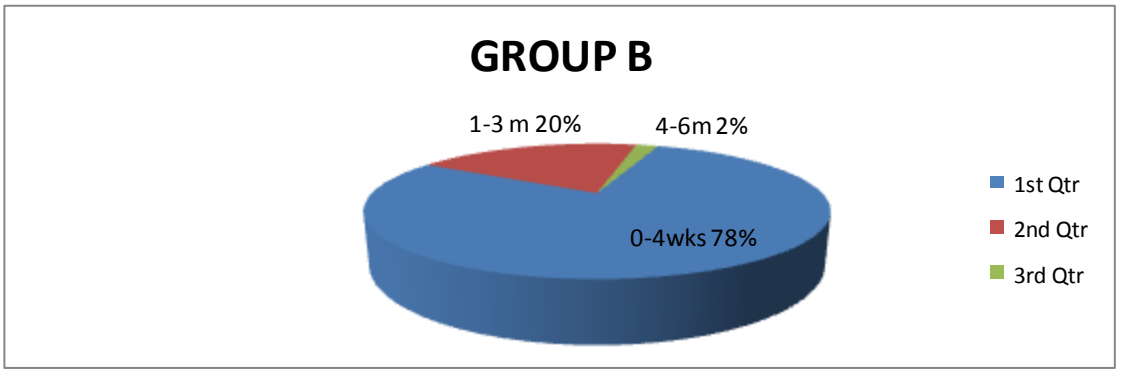


According to *Doshadushti* in both Groups A and B, patients with *Pitta- Raktadushti* i.e. 23 and 21 respectively were seen, followed by 11 patients with *Vata-Pitta* in Group A whereas 11 patients of *Pitta-Kapha* in Group B. Rest of the patients with other types of *Doshadushti were less in number.*

d) Chronicity of *Dushtavrana*: Total patients- 100

Chronicity of *Dushtavrana*	**Group A (Trial)**		**Group B (Control)**	
	No. of patients	**%**	**No. of patients**	**%**
00-04 weeks	44	88%	39	78%
01 m-03 months	04	08%	10	20%
04 m- 06 months	02	04%	01	02%
07 m- 01 years	00	00%	00	00%
Above 01 years	00	00%	00	00%

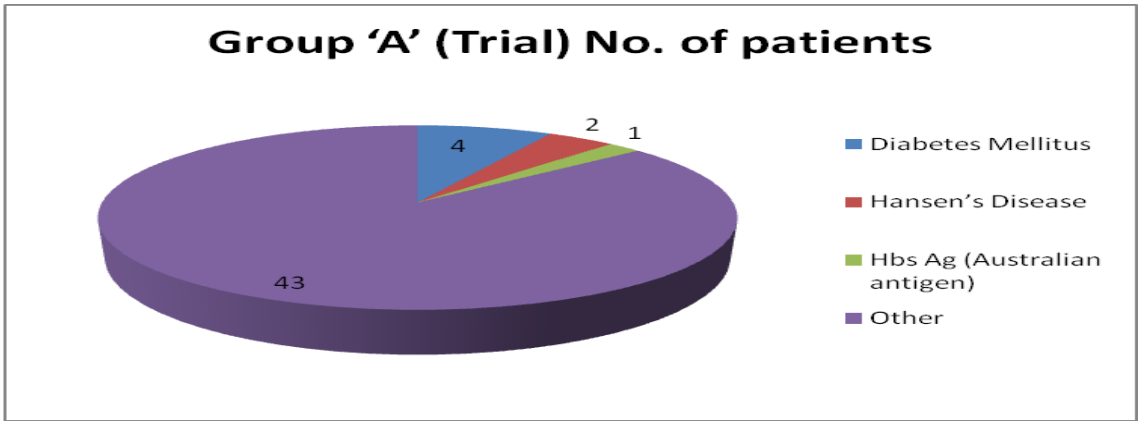


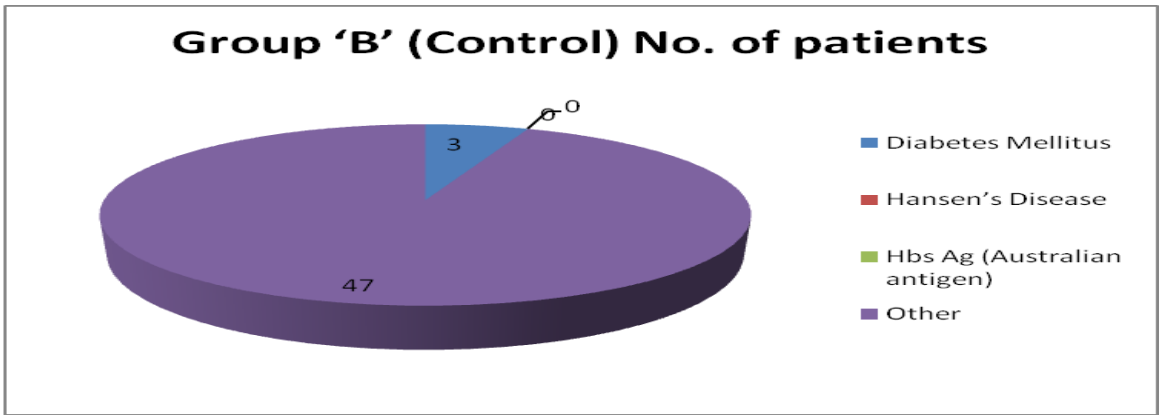


As per chronicity, in both groups patients from 00-04 wks were seen maximum i.e. 44 and 39 followed by 01-03 months i.e. 04 and 10 in group A and B respectively.

d) Associated Condition: Total patients- 100

Associated Condition	Group 'A' (Trial)		Group 'B' (Control)	
	No. of patients	%	No. of patients	%
Diabetes Mellitus	04	08%	03	06%
Hansen's Disease	02	04%	00	00%
Hbs Ag (Australian antigen)	01	02%	00	00%
Other	43	86%	47	94%

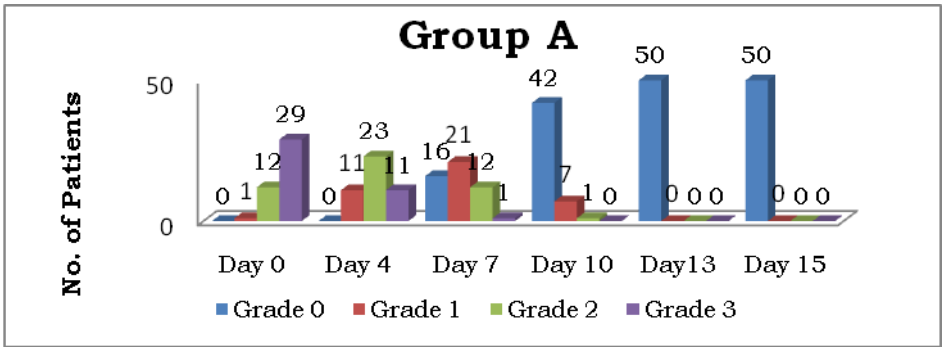




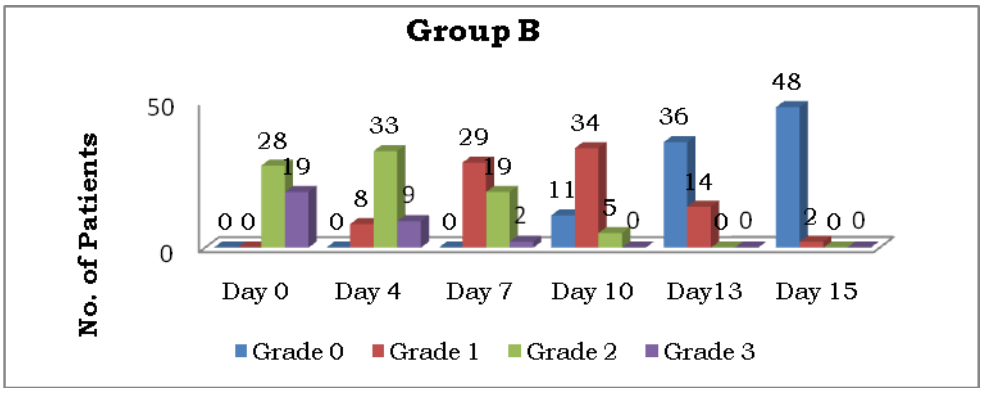
In associated condition, patients with Diabetes mellitus were seen maximum from both groups i.e. 04 and 03 respectively followed by Hansen's disease in Trial group i.e. 02.

***Srava* / Discharge**

Group A	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	0	0	16	42	50	50
Grade 1	1	11	21	7	0	0
Grade 2	12	23	12	1	0	0
Grade 3	29	11	1	0	0	0



Group B	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	0	0	0	11	36	48
Grade 1	0	8	29	34	14	2
Grade 2	28	33	19	5	0	0
Grade 3	19	9	2	0	0	0



Srava	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Trial Group	3.0	0.0	-6.299[a]	0.000	96.2	Significant
Control Group	2.0	0.0	-3.994[a]	0.000	91.3	Significant

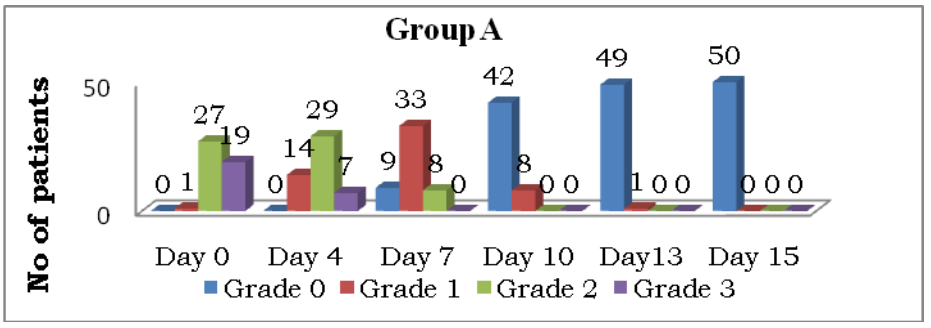
Since the observations are on ordinal scale Wilcoxon Signed Rank test was used to assess the efficacy of Trial and Control Drug. From the above table it was observed that P-values for both the groups are less than 0.05, hence it can be concluded that effect in Trial group and Control group are significant on Srava,

	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value
Srava	Control Group	50	17.70	354.00	144.0	0.098
	Trial Group	50	23.30	466.00		
	Total	100				

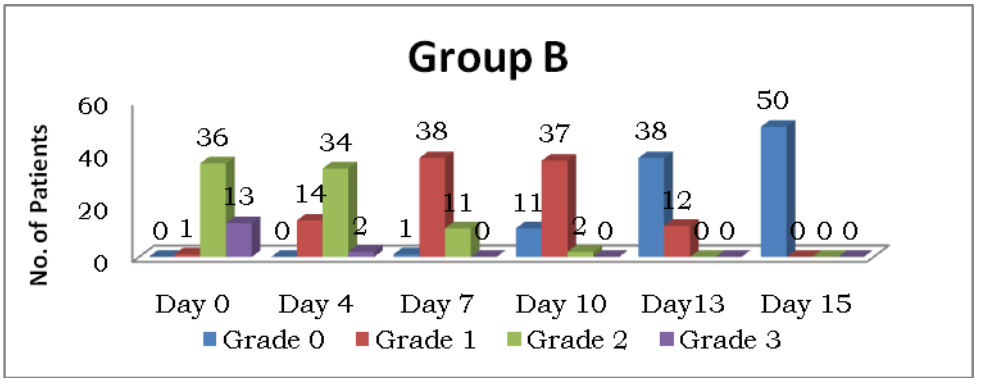
For comparison between the effect of Trial and Control Drug Mann Whitney U test was applied, from the above table it was observed that P-Value is greater than 0.05, hence it can be concluded that there is no significant difference in the effect in Trial group and Control group on *Srava*.

***Varna* / Colour**

Group A	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	0	0	9	42	49	50
Grade 1	1	14	33	8	1	0
Grade 2	27	29	8	0	0	0
Grade 3	19	7	0	0	0	0



Group B	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	0	0	1	11	38	50
Grade 1	1	14	38	37	12	0
Grade 2	36	34	11	2	0	0
Grade 3	13	2	0	0	0	0



Varna	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Control Group	2.0	0.0	-3.938[a]	0.000	87.9	Significant
Trial Group	2.0	0.0	-6.403[a]	0.000	95.6	Significant

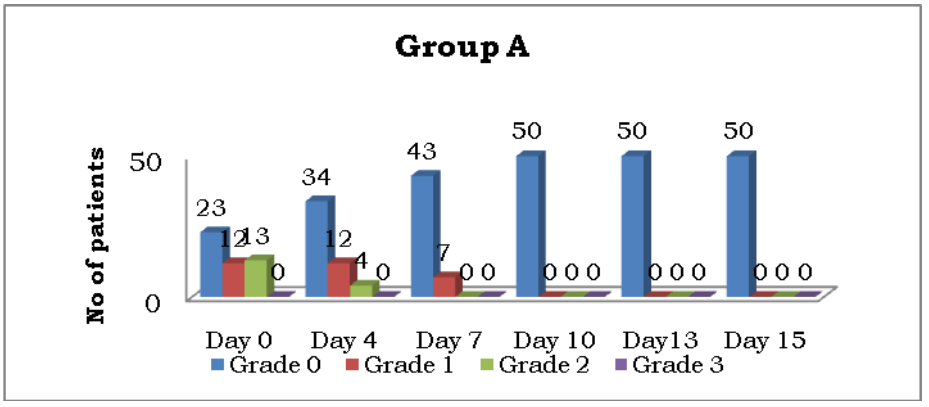
Since the observations are on ordinal scale Wilcoxon Signed Rank test was used to assess the efficacy of Trial and Control Drug. From the above table it was observed that P-values for both the groups were less than 0.05, hence it can be concluded that effect in Trial group and Control group are significant on *Varna*.

	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value
Varna	Control Group	50	14.75	295.00	85.0	0.000
	Trial Group	50	26.25	525.00		
	Total	100				

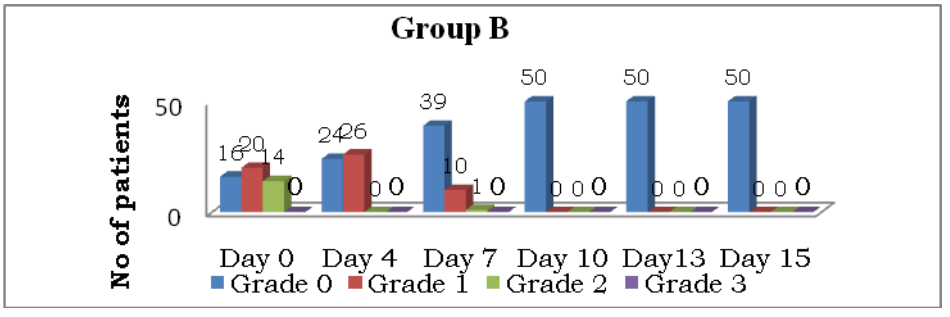
For comparison between the effect of Trial and Control Drug Mann Whitney U test was used, from the above table it was observed that P-Value is less than 0.05, hence it can be concluded that there is significant difference in the effect in Trial Drug and Control Drug on Varna. Further it can be observed that Mean Rank of Trial Group is more, hence Trial Group is more effective than Control Group in Varna.

***Gandha* / Smell**

Group A	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	23	34	43	50	50	50
Grade 1	12	12	7	0	0	0
Grade 2	13	4	0	0	0	0
Grade 3	0	0	0	0	0	0



Group B	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	16	24	39	50	50	50
Grade 1	20	26	10	0	0	0
Grade 2	14	0	1	0	0	0
Grade 3	0	0	0	0	0	0



Gandha	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Control Group	1.0	0.0	-3.520[a]	0.000	100.0	Significant
Trial Group	1.0	0.0	-4.651[a]	0.000	100.0	Significant

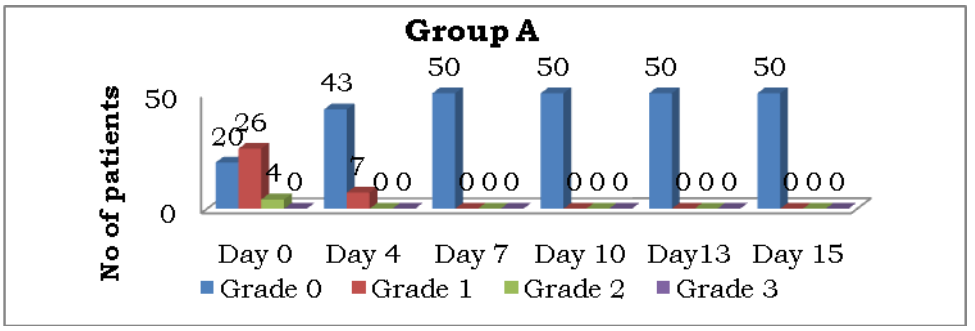
Since the observations are on ordinal scale Wilcoxon Signed Rank test was used to assess the efficacy of Trial and Control Drug. From the above table it was observed that P-values for both the groups were less than 0.05, hence it can be concluded that effect in Trial Group and Control Group are significant on *Gandha*.

	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value
Gandha	Control Group	50	21.58	431.50	178.5	0.534
	Trial Group	50	19.43	388.50		
	Total	100				

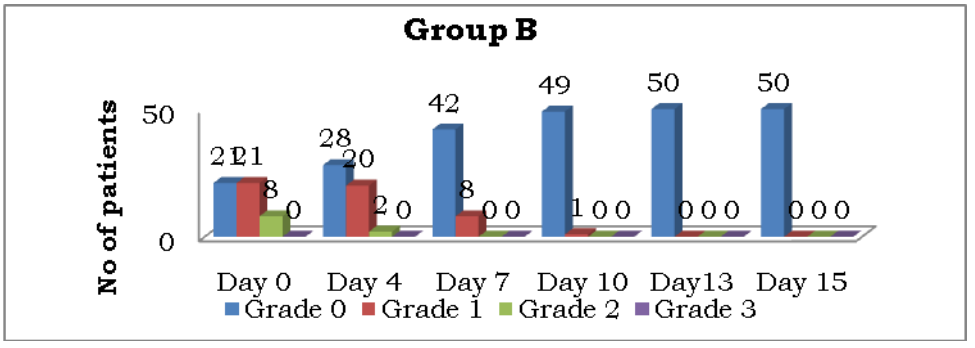
For comparison between the effect of Control Group and Trial Group Mann Whitney U test was applied, from the above table it was observed that P-Value is greater than 0.05, hence it can be concluded that there is no significant difference in the effect in Control Group and Trial Group on *Gandha*.

***Ushma* / Temperature**

Group A	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	20	43	50	50	50	50
Grade 1	26	7	0	0	0	0
Grade 2	4	0	0	0	0	0
Grade 3	0	0	0	0	0	0



Group B	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	21	28	42	49	50	50
Grade 1	21	20	8	1	0	0
Grade 2	8	2	0	0	0	0
Grade 3	0	0	0	0	0	0



Ushma	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Control Group	1.0	0.0	-3.666[a]	0.000	100.0	Significant
Trial Group	1.0	0.0	-5.203[a]	0.000	100.0	Significant

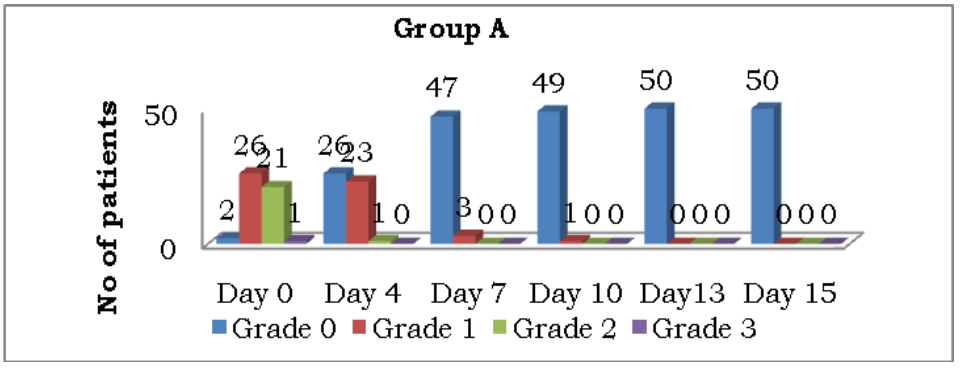
Since the observations are on ordinal scale Wilcoxon Signed Rank test was used to assess the efficacy of Control and Trial Drug. From the above table it was observed that P-values for both the groups are less than 0.05, hence it can be concluded that effect in Trial Group and Control Group are significant on *Ushma*.

	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value
Ushma	Control Group	50	23.60	472.00	138.0	0.061
	Trial Group	50	17.40	348.00		
	Total	100				

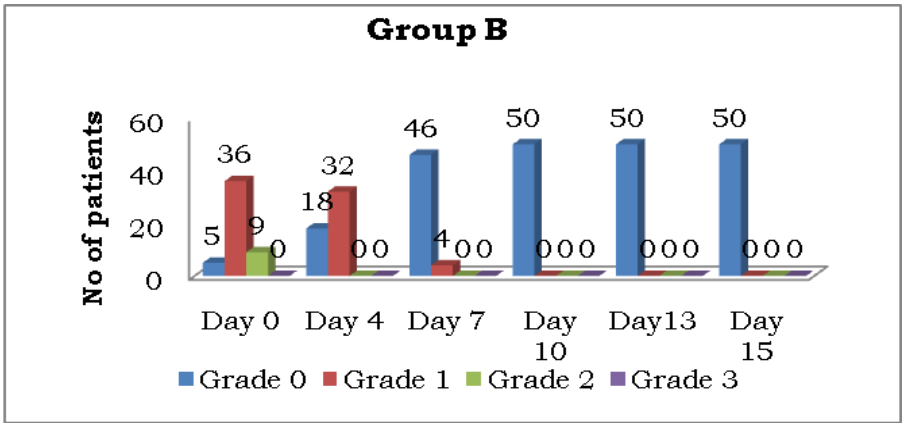
For comparison between the effect of Trial Group and Control Group Mann Whitney U test was used, from the above table it was observed that P-Value is greater than 0.05, hence it can be concluded that there is no significant difference in the effect in Trial Group and Control Group on *Ushma.*

***Araktata* / Redness**

Group A	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	2	26	47	49	50	50
Grade 1	26	23	3	1	0	0
Grade 2	21	1	0	0	0	0
Grade 3	1	0	0	0	0	0



Group B	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	5	18	46	50	50	50
Grade 1	36	32	4	0	0	0
Grade 2	9	0	0	0	0	0
Grade 3	0	0	0	0	0	0



Araktata	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Control Group	1.0	0.0	-3.508[a]	0.000	100.0	Significant
Trial Group	1.0	0.0	-6.222[a]	0.000	100.0	Significant

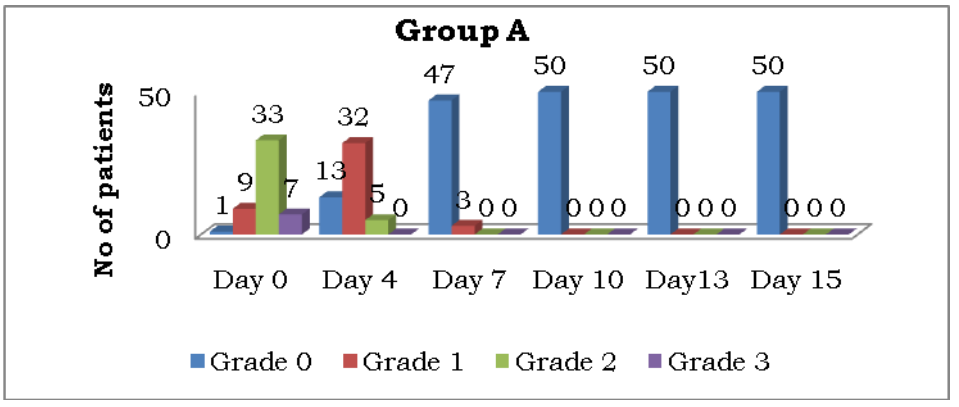
Since the observations are on ordinal scale Wilcoxon Signed Rank test was used to assess the efficacy of Trial and Control Drug. From above table it was observed that P-values for both the groups were less than 0.05, hence it can be concluded that effect in Trial Group and Control Group are significant on *Araktata.*

	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value
Araktata	Control Group	50	17.85	357.00	147.0	0.123
	Trial Group	50	23.15	463.00		
	Total	100				

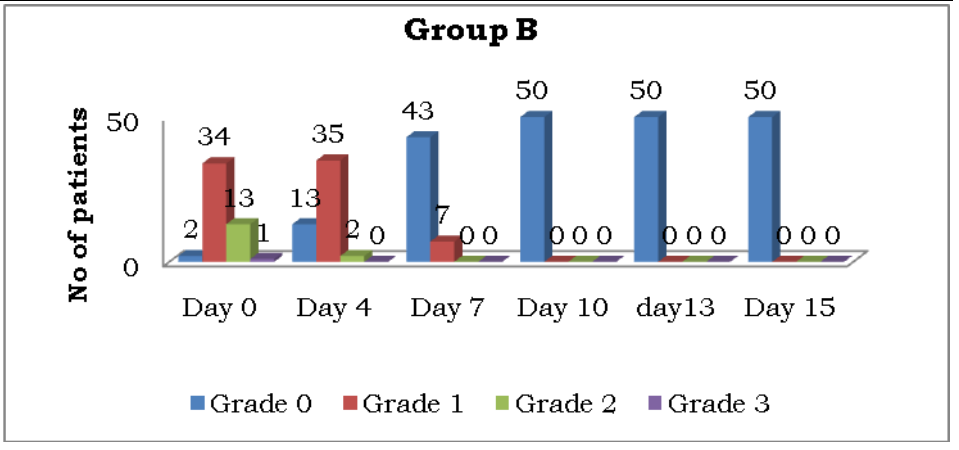
For comparison of effect on Trial and Control Group Mann Whitney U test was applied, from the above table it was observed that P-Value is greater than 0.05, hence it can be concluded that there is no significant difference in the effect in Trial Group and Control Group on *Araktata.*

***Vedana* / Pain**

Group A	Day 0	Day 4	Day 7	Day 10	Day13	Day 15
Grade 0	1	13	47	50	50	50
Grade 1	9	32	3	0	0	0
Grade 2	33	5	0	0	0	0
Grade 3	7	0	0	0	0	0



Group B	Day 0	Day 4	Day 7	Day 10	day13	Day 15
Grade 0	2	13	43	50	50	50
Grade 1	34	35	7	0	0	0
Grade 2	13	2	0	0	0	0
Grade 3	1	0	0	0	0	0



Vedana	Median		Wilcoxon Signed Rank W	P-Value	% Effect	Result
	BT	AT				
Control Group	2.0	0.0	-4.089[a]	0.000	97.7	Significant
Trial Group	2.0	0.0	-6.339[a]	0.000	100.0	Significant

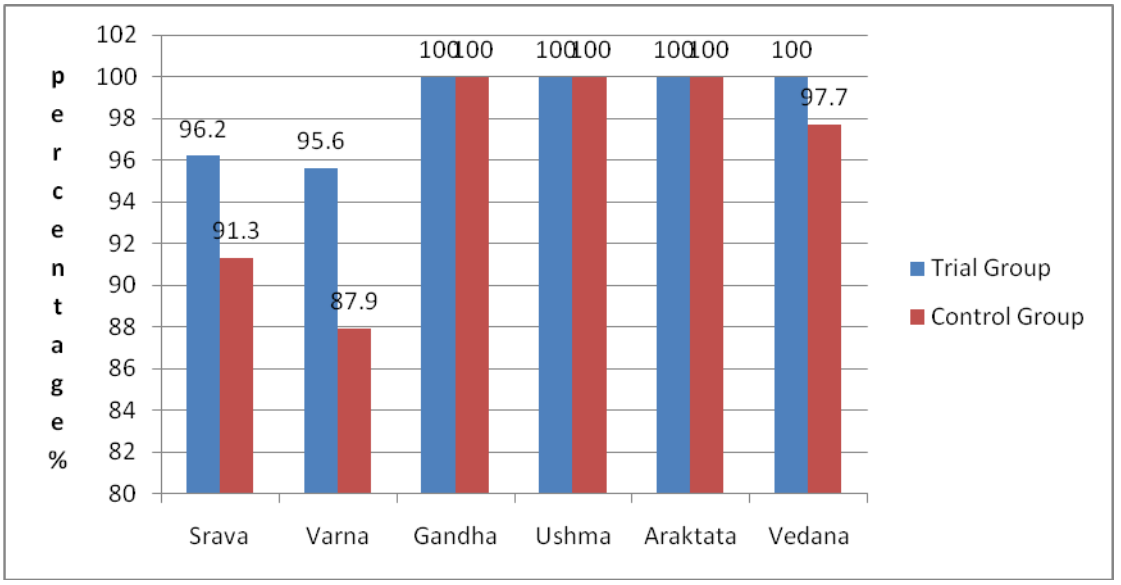
Since the observations are on ordinal scale Wilcoxon Signed Rank test was used to assess the efficacy of Trial and Control Group. From the above table it was observed that P-values for both the groups were less than 0.05, hence it can be concluded that effect in Trial Group and Control Group are significant on *Vedana.*

	Group	N	Mean Rank	Sum of Ranks	Mann-Whitney U	P-Value
Vedana	Control Group	50	21.30	426.00	184.0	0.609
	Trial Group	50	19.70	394.00		
	Total	100				

For comparison between the effect of Control Group and Trial Group Mann Whitney U test was applied, from the above table it was observed that P-Value is greater than 0.05, hence it can be concluded that there is no significant difference in the effect in Trial Group and Control Group on *Vedana*.

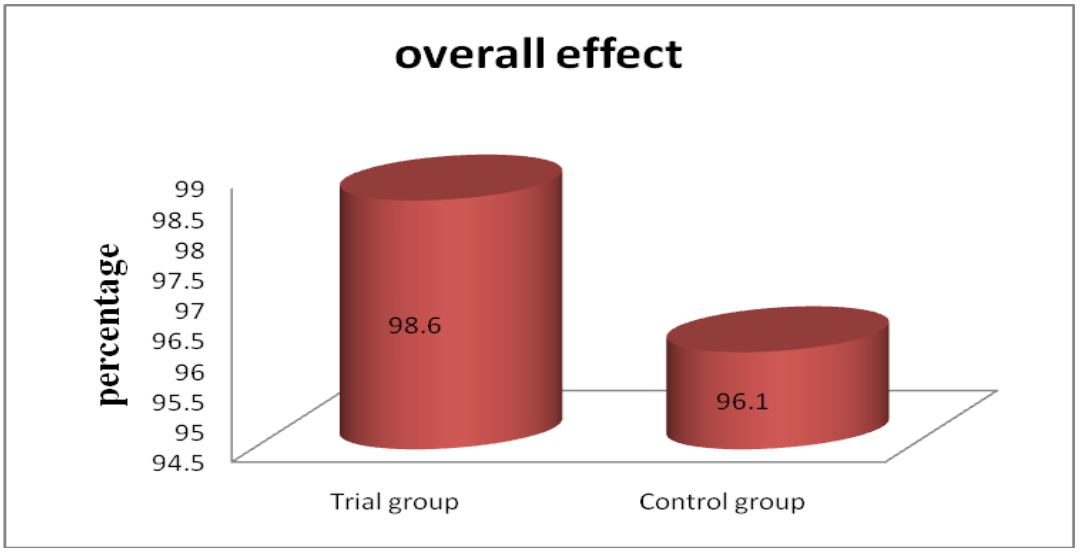
Comparism of assessment of both groups

Parameter	Trial Group	Control Group
Srava	96.2	91.3
Varna	95.6	87.9
Gandha	100.0	100.0
Ushma	100.0	100.0
Araktata	100.0	100.0
Vedana	100.0	97.7



At the end of a 15 days period, symptoms of *Srava*, *Varna* and *Vedana* showed better efficacy in Trial group, whereas equivalent efficacy was noted in *Gandha*, *Ushma* and *Araktata*.

Overall effect:



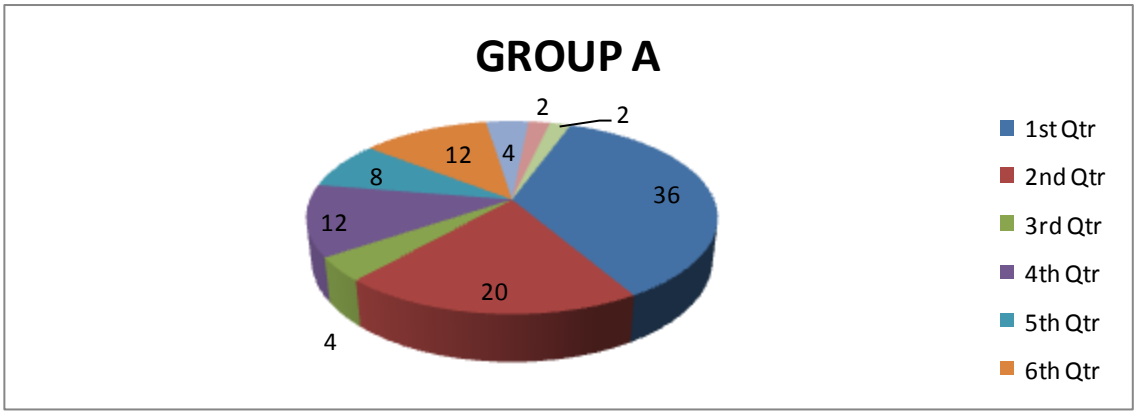
The Overall effect of the Control group was 96.1% while that of the Trial group was 98.6%. This was indicative of the greater efficacy of the Trial drug.

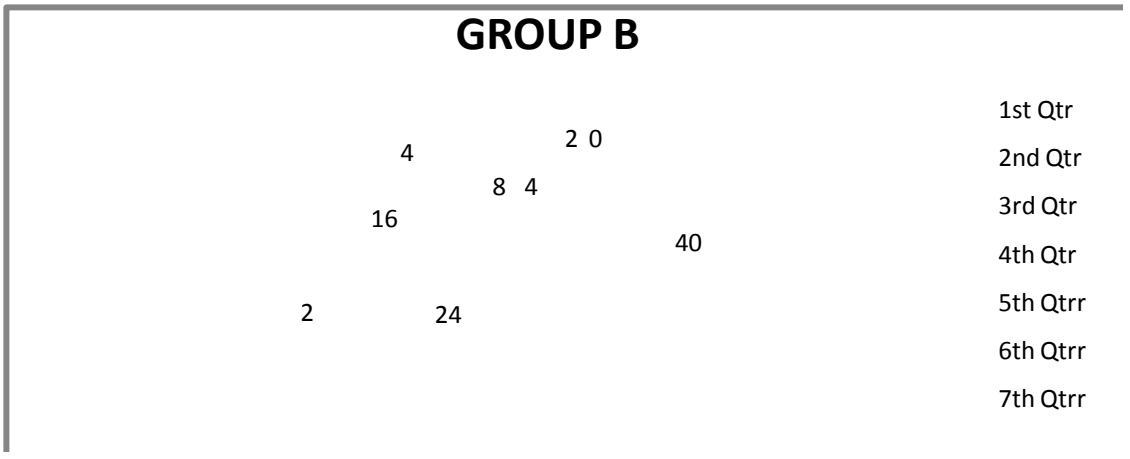
C) Investigative:

Organisms Detected: Total patients- 100

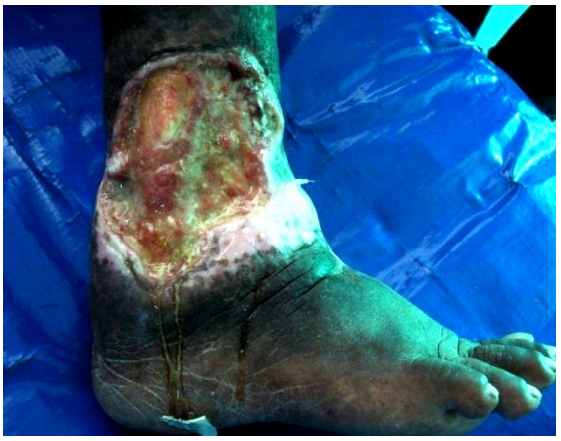
Organisms	Group 'A' (Trial)		Group 'B' (Control)	
	No. of patients	%	No. of patients	%
Staphylococcus aureus	**18**	**36%**	**20**	**40%**
Escherichia coli	**10**	**20%**	**12**	**24%**
Pseudomonas spp	**06**	**12%**	**08**	**16%**
Klebsiellaspp	**06**	**12%**	**04**	**08%**
Citrobactorkoseri	04	08%	02	04%
Commensol	02	04%	02	04%
Proteus vulgaris	02	04%	01	02%
Streptococcus	01	02%	01	02%
Stenophamonasm altophilia	01	02%	00	00

First 04 organisms from the above table were seen in maximum numbers in both groups and rest of the organism was found sparingly.

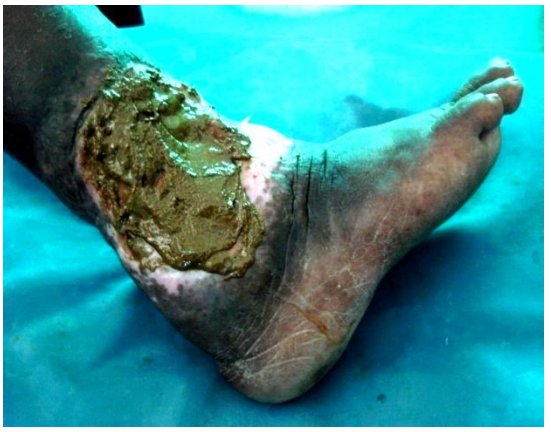




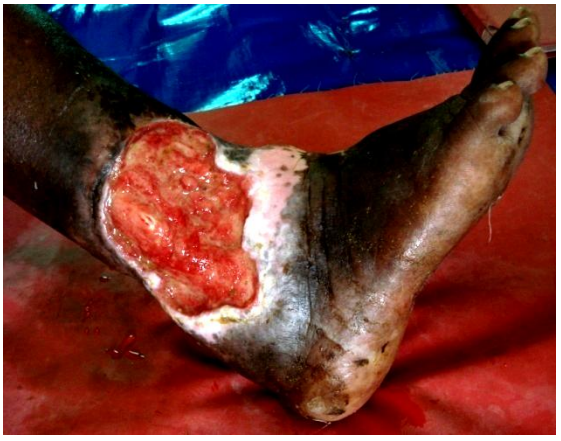
Day 01



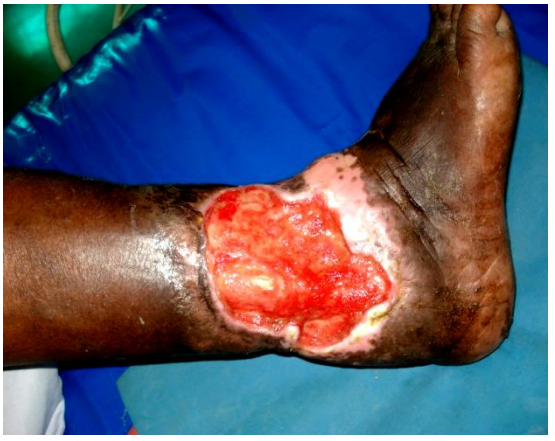
Application



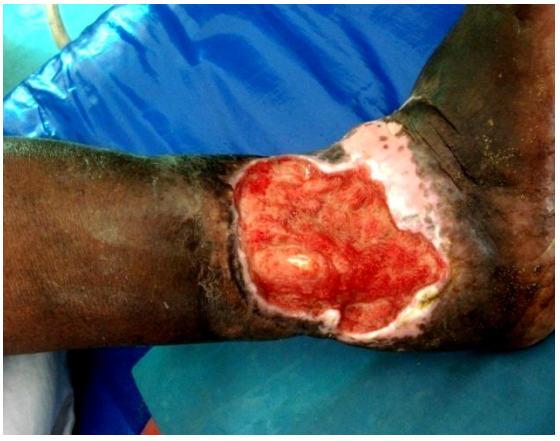
Day 04



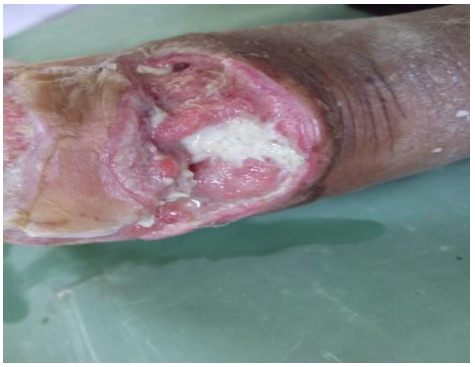
Day 07



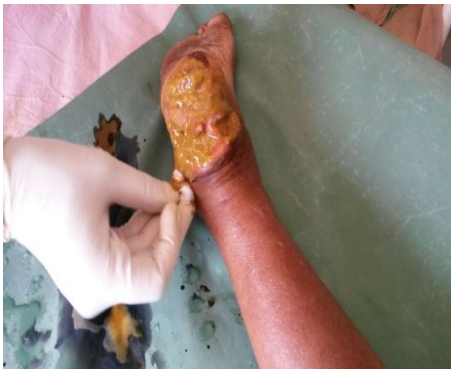
Day 10



Day 01

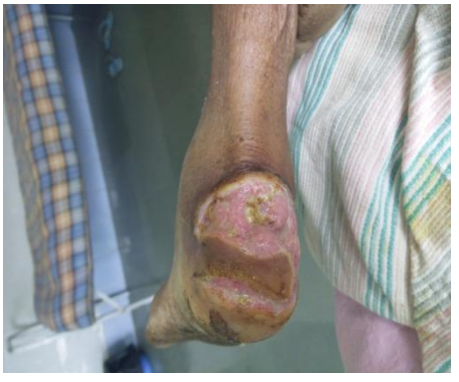


Drug Application



Day 04

Day 07



कार्मुकत्व

व्रण

⇩

आलेप-षष्टी उपक्रमाः सु . चि . १ आद्य उपक्रमः सु . सू . १८

⇩

त्वक-भ्राजकपित्त ...आलेपादीनां ...सु . सू . २१

⇩

प्रल्हादने**शोधन**शोफस्यव्रणस्य हरणे उत्सादने रोपणे

⇩

दार्वी+मधु आलेप-व्रणनुत् ध . नि सु . सू . ४५

⇩

क्लेदशोषण-तिक्त कषाय लघु रूक्ष लेखन

⇩

व्रणशोधन

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Discussion

Discussion

Daruharidra + *Madhu* were authenticated and standardized prior to utilization as a local application after mixing in an appropriate ratio i.e. 1:2. Clinical trials were conducted and selected patients were alternately allotted to Trial and Control groups. Local wound care was followed in accordance with the study design. Regular follow-ups at an interval of 3 days were conducted for a maximum of 15 days.

Total 167 patients were screened, of which 135 were found to be eligible for inclusion in the study. 129 out of them consented to participate, whereas 06 refused to do so. Thus, a total of 129 patients were studied in both groups together but 21 were dropouts. The reason for dropout was either aggravation in the condition during the study requiring other interventions, lack of or irregular follow-up, refusal to comply to study norms or instructions etc.

On the basis of **'AGE'**, patients in 33-64 years age group were maximum (52%) followed by 17-32 years age group (28%).This is the age group where a person would be in the working / active phase of life. 33-64 years is the mature age group. Here the *Dhatus* i.e. the seven major structural components that stabilize and sustain the body of an individual would have reached a maturation phase i.e. the time period when growth of an individual is complete and the ageing process begins. Hence it may show a delay in the healing process. A majority of patients of both groups belonged to this category. 100% of the patients of Group A showed *Upashaya* (alleviation) in *lakshanas*. This difference is noteworthy in the prognosis of the condition.

17-32 years is probably the age where in a person would be in the sports / student category of life, a more of a flirting with life kind of phase. This also is the crucial career formation stage / platform, an attempt to do a bit more is the key for a bright future. Similarly, 17- 32 years is the age group of **neogenesis** being at it's the best.

As per the **'GENDER',** the maximum number of cases were seen in males (52%). Although no such rule exists, this is just an observation that the probable causes could be attributed to their occupations and habits thus making them more prone to the condition. On the other hand, ignorance towards health by the females in our society could be an influencing factor. The situation at this stage could be a more magnified one and one of more serious dimensions making its management a bit more complicated. 93.33% of male patients in Group A showed *Upashaya* in *lakshanas*.

Observations made regarding the ***'HETU'*** as expected yielded *Agantuja hetu* as the prime one. The labor class or the 'earn your bread daily' kind of class, in their daily schedules faced these traumas and overlooking of the condition till it crippled / hindered their daily routine was an additional aspect. This aspect showed a maximum number of patients of *Agantuja hetu* (52%). Considering the current life style, food habits, addictions etc. the incidence of *Agantuja hetu* is obvious. Accident was the most common of these *hetus*, irrespective of age and sex. 93% of the patients of Group A showed *Upashaya* in *lakshanas*.

Considering the ***STHANA*** it was seen that the maximum number of patients of Group A showed *Vranotpatti* (ulcer formation) in lower limb (64%) followed by other regions (28%).

Lower limb conditions were a majority of the cases found. Occupation could be a contributory fact here. These cases are expected to heal slower (a classical thought) owing to compromised vascularity. Also the hygiene point of view shows that lower limbs are a place where less attention is paid as compared to the other body parts. These reasons could play a role in the results seen. The lower limb is more prone to *vranotpatti* but has less vascularity, thereby increasing the chances of chronicity. 95% of patients of Group A showed *Vranashodhan* in spite of above aspects.

On the basis of ***DOSHADUSHTI,*** maximum number of patients of Group A presented with a '*Pitta.-Raktaja Doshadushti* (46%) followed by

'*Vata-Pittaja*' (22%). The involved *Doshas* that are capable of vitiating the different bodily tissues, showed a definitive *Pitta-Raktaja* predominance. *Agantuja hetu* is the responsible factor. Also **'*Pittahate nasti pakah*'** is the fact highlighted here, i.e. no *dushti* without the process of paka or transformation of substances with the help of *Agni* viz. Suppuration or inflammation and *Pittad raktam* is a must as an important factor here. The *Samprapti* (pathology) of *Dushtavrana* involves *Twak* (skin), *Rakta* (blood), *Mansa* (Flesh to provide covering over the skeleton) and *Meda* (whose function is to provide *Snehana*). The maximum number of patients with *Pitta - Rakta - doshadushti* as seen in Group A presented an *Upashaya* in *lakshanas* which may be attributed to the *Tikta* (Bitter), *Kashaya Rasa* (Astringent)- *Doshapachak* (Digestion of *dosha*), *Raktashodhak (blood purifier), Prasadaka* (processes of biotransformation) and *Lekhaniya* (scraping, scratching, substances that reduce excess body tissue) properties of the Trial group.

The **"CHRONIC"** wounds with an age of 0-4 weeks formed a bulk of cases in both the groups. Those cases which had been operated for an abscess and that resulted in infected wounds or trauma cases presenting as infected ones were the core ones here. These had to be the ones where a cleaning of wounds with minimum trauma inflicted to the granulations was necessary, resulting in faster cleaning or granulation so that further '*Vaikrutapaham*' measures became simpler. Noteworthy in this group were those cases having an onset of 4 months or more. In such cases, a routine or orthodox line of management yielded no or poor results thereby proving to be an unsatisfactory measure. This was a condition wherein results seen were marked and the photos attached prove the point.

From the 'Chronicity' aspect of the *Vrana* the Trial group recorded a maximum number of patients in the Group A (0 day - 4 weeks) i.e. 90%, followed by (1-3 months) i.e. 8%. Besides this, 33.33% patients with *Dushtavrana* of age of wound more than 1 month were included in Group A and showed an *Upashaya* in *lakshanas* within 7-10 days in spite of their

chronicity (100%). These patients had not shown any response to previous other treatment.

Taking into consideration the **'Associated Conditions'** a maximum number of patients showed no other conditions associated with the disease i.e. 86%. 4 patients (8%) of Group A were suffering from DM, 1 patient (2%) each from DM + Hbs Ag, Hansen's disease and burns. Group B on the other hand had only 3 patients (6%) of DM.

An important contribution worth mentioning in these cases with ***Associated Conditions*** is that they are thankless cases documented to be compromised and usually show poor results. These were intentionally included in the study in an attempt to challenge the drug effect to its limits and study its role under adverse situations. A common belief of modern science is that honey is not to be used in diabetic cases for both internal and external uses. We trusted the texts and decided to take on the belief. This was basically, since it was an external application, and secondly the thought was backed up by strong references from the texts. It was found that the local application of *Daruharidra* + *Madhu* yielded excellent results (100%) within 7-10 days.

The Culture sensitivity test was conducted using water extract of *Daruharidra* and *Madhu* in our laboratory. The **Organisms** found in the wound were mostly *Staphylococcus aureus*. It was the main bacteria found in 18 patients of the total sample size, followed by *Escherichia coli* which were found in 10 patients in group A. *Pseudomonas spp* and *Klebsiella spp* were found in total 12 patients, 6 each. *Proteus vulgaris, Stenophamonas maltophilia, Commensol, Streptococcus* and *Citrobactor koseri* were rarely found. Except *Stenophamonas maltophilia,* all other bacteria were also found in Control group. The Trial drug *Daruharidra* and *Madhu* proved to be effective in each and every case. The Control drug Povidone Iodine also showed good results but took some more time than the trial drug.

Besides, the culture sensitivity test, all patients from both groups were subjected to a prescribed set of investigations, just routine ones, which were a self explanatory need.

After an attempt to record the data, the results obtained were analyzed and evaluated because research deals with not only data collection but a scientific, rational and symptomatic approach to analyze, dissect and evaluate them and thus conclude a baseline statement.

After a sincere 15 days effort and work regarding each case, the observed conditions pertaining to a few parameters were recorded for evaluation. Changes seen in the '*VRANA*' w.r.t. *Srava, Varna, Gandha, Ushma* (local temperature), *Araktata, Vedana* as well as *Swaroop* (appearance) were recorded symptomatically and factors leading to the changes were evaluated.

This is explicable on the basis of the properties of the drug combination viz. *Daruharidra*[4] + *Madhu*[5]. *Daruharidra* possesses *Laghu* (Light/ lightness), *Ruksha* (dry, rough) and *Vishada Gunas* (Non adhesiveness), is *Tikta, Kashaya Rasatmak*, *Ushna Veerya* (hot potency)and *Katu Vipaka* (Pungent)[4].

A few worth mentioning are:

Especially properties like *Tikta, Kashaya Rasa, Ushna Virya, Katu Vipaka* of *Daruharidra*[4] properties like *Chedana* (removal, destruction), *Lekhana, Shodhana, Kapha-Pitta Nashana* (pacification), *Vishanashana* (Antitoxic medication), *Vedanashamana, Twak-doshahara* (alleviates vitiated skin) make it quite effective in conditions like *Meha* (Diabetes mellitus), *Twakdosha* (skin disorders), *Dushtavrana* and *Kushtha* (skin disorders).

Madhu[5] has *Madhur*, *Kashaya Rasa, Katu Vipaka, Sheeta Veerya* (cold potency) and is *Laghu, Ruksha, Sookshma* (minute/penetrating) and *Yogavahi* (Catalyst; The one that accelerates the properties of others). Its prominent *karma* includes *Lekhana, Shodhana, Prasadana* (soothing and clarifying), *Ropana,* and *Tridosha-nashana* (pacification of *Tridosha*). It is

effective in *Meha* and is *Vranashodhana* besides having a *Vishanashana* effect. As per *Ashtang-Hridaya Sutrasthana* 10/19, *Ruksha guna* and *Tikta rasa* are *Kleda medovishoshana* (wet, oily substance absorbed from the wound), *Kashaya rasa* is *Ruksha-Asravishodhana* (dry, rough cleansing of the wound) and *Kleda medovishoshana* while *Madhur rasa* is *Pittanilvishapaha* (alleviates *Pitta, Vata* and *Visha*) and *Dhatunamprabalambalam* (excellent strengthening to the *dhatus*).

The *lakshana* to be considered in case of *Dushtavrana*[3], are *Srava, Varna, Gandha, Ushma, Araktata, Vedana* and *Swaroop* which shows a change as the *avastha* changes from that of a *Dushta* to *Shuddhavrana*[6].

The most important diagnostic features of *Dushtavrana are Putipuyasravi* (Purulent discharge), *Dushtashonit sravi (vitiated blood discharge), Putipuymansa* (Purulent fleshy discharge), *Gandho atyartham* (foul smell), *Vedanavan* (pain), *Raag* (Redness), *Atyushna* (excess heat), *Amanodnyadarshan* (Unpleasant appearance), *Krishna- Rakta Pitta Shukladinam Varna* (Black- red- yellowish white in colour).

On the other hand, those demarkating a *Shuddhavrana* are, *Jivhatalabho* (red like the base of the tounge), *Mrudu* (soft), *Snigdha* (slimy/unctous/oily), *Shlakshano* (suple), *Vigatavedana, Avedano* and *Nirasravo* (without any discharge).

These are exactly the features that where embarked upon or aimed to attain.

Discussing about the properties of the drugs effective upon the condition, the references from texts are the ones banked upon.

The *Tikta, Kashaya Rasa, Ushna, Virya, Katu Vipaka* of *Daruharidra* combined with *Kashaya rasa, Katuvipaka, Rukshaguna* to provide a synergistic effect. This helps in the marked reduction of *Dushtavrana*, thereby reducing and finally cleaning the stagnant collection of debris and discharge from the wounds. This also helped reduce the foul odour from the site. Once the site was cleaned of discharge and secretions, defense mechanism helped to overcome the infections and avoid a recurrence. The

process of cleaning the wounds added with the *Vedanashamak* effect of *Daruharidra* soon reduced pain. A reduction of the infective and inflammatory process also reduced the calor, dolor and rubor at site. Besides, '*Ushnata'* helped increase the local blood supply, thereby increased the nourishment to the site and aided in neogranulation formation. The *Kledashoshaka, Lekhana* and *Doshnashaka* properties of the drugs helped our cause. *Vishanashana* effect is one property shared by both the drugs. Here *Visha* is comparable to the pus and infected material i.e. Srava. Which when reduced, the rest of the job was simple. Here came in the *Aasravishodhana, Prasadana and Dhatunamprabalambalam* properties of the duo, similarly the previously mentioned properties avoided any new or further slough formation at the site thereby maintaining the *Shuddha avastha*, and also aiding or promoting granulation formation.

The method employed was one of minimum trauma infliction at the site viz. washing of site with simple NS without scraping to clear the previous *lepa* or loose material as such and application of *lepa* locally covered by dressing was all that was used. An observation was that the dressing removal next day was very simple, painless and non traumatizing to the new granulation tissue. All these together went on to cleanse the wounds i.e. *Dushta* to *Shuddhavrana*. It was observed that this was achieved at a much faster rate and even the quality of granulation was better i.e. healthy granulation with no fibrosis, hence no cicatrisation i.e. *Vaikrutapaham.* During a study of the combination *Daruharidra* + *Madhu*, no untoward effect or allergies were reported.

Honey contains glucose oxides an enzyme which produces hydrogen peroxide (H_2O_2), a known antiseptic. The produced amount is very low helps an antiseptic effect to be achieved without the damaging effect of the H_2O_2 used otherwise. Honey has been proved to be effective against a host of organism esp. *Staphylococcus aureus*. Honey is especially useful against the multidrug resistant strain of organisms.

Honey (topical) has been used since antiquity to enhance wound healing and numerous other conditions. It is a strong disinfectant, antibacterial, antibiotic and very rich in amino-acids. There is a study in infants with large open wounds (where conventional drugs failed to work) that showed magnificent results on recovering fully, both wounds and infections. Honey was a traditional remedy in India from ancient years to treat skin conditions like eczema and skin infections.

Dr. John R Christopher of the Thompsonian or American Physiomedicalist School studied the antiseptic, venous circulatory tonic properties of *Berberine* in 1976. He says that taking Goldenseal or *Berberine* internally will not directly kill or inhibit bacteria or other infectious agents in most of these conditions, unless coming in direct contact with the infected tissue.

Drs. Calvin and Agatha Thrash of the American Naturopathic and Regular School have presented papers regarding the role of *Berberine* in skin infections and inflammations in 1981 itself.

Abstracts of work done by Drs. Priest and Priest of the British Naturopathic and Physiomedicalist Schools, 1982, show the antiseptic, general tonic, laxative, mucous membrane tonic, skin and mucous membrane ulcers, venous circulatory tonic, wide reputation as an 'herbal antibiotic', based on scientific research and the clinical use of constituent *Berberine.* When Goldenseal is used topically i.e. put directly onto an infected wound or ulcer, the *Berberine* or other alkaloids may have such an effect on the microorganisms in the wound.

The control drug- Povidone-Iodine exhibits a broad range of microbicidal activity against bacteria, fungi, protozoa, and viruses. Free iodine, slowly liberated from the povidone-iodine (PVP-I) complex in solution, kills eukaryotic or prokaryotic cells through iodination of lipids and

oxidation of cytoplasmic and membrane compounds. These properties are responsible for the reduction of symptoms in the control group.

However, there are few disadvantages of the abovesaid drug Povidone-iodine eg. Skin irritation, rarely severe allergic manifestation (rash, hives, itching, difficulty breathing, tightness in the chest, swelling of the mouth, face, lips, or tongue).

Thus, it should be stressed upon and stated that the Trial drug of *Daruharidra* + *Madhu* should not be reserved for multi drug resistant strains and as a last remedy but employed as a prime and important drug to be started with and continued till wound heals completely.

It would be rather selfish and unfortunate to look down upon this drug as something coming out of an alternative branch of medicine but rather use this **gift of nature for the benefit of mankind.**

Limitations of study:

It needs to be emphasized that a more objective or definitive parameter needs to be employed eg. Serial biopsy and histopathological studies of the wound before, during and after the course of treatment.

The study should also include effects observed on burn wounds, malignant and tuberculous ulcers (from the granulation and wound healing aspect), their results must be ascertained, thereby exploring untreaden paths of *Ayurved*.

Conclusion

Conclusions

The bark of *Daruharidra* was authenticated and finely ground to a powder, sieved through Sieve size 60 and standardized as per the API standards for *Churna* (medicinal powder). The values were in accordance with the aforesaid.

To conclude, the *lakshanas* of *Srava, Varna, Gandha, Ushma, Araktata* and Vedana showed significant reduction in gradation within the stipulated time **period, on local application of *Daruharidra* + *Madhu*, remarkably so in the in the Trial group.**

***Daruharidra* + *Madhu* has also proved as an excellent remedy for 4 strains of organisms viz. *Staphylococcus aureus, Escherichia coli*, *Pseudomonas spp* and *Klebsiella* detected in the wounds as per the study.**

Hence, a low sample size fails to draw a specific conclusive statement regarding drug efficacy in their case.

Besides, the above strains of micro-organisms 5 other strains viz. *Citrobactor koseri, Commensol, Proteus vulgaris, Streptococcus and Stenophamonas maltophilia* were also detected through in fewer cases and drug yielded good results in them too.

Further scope:

- Clinical trials of drug efficacy in each specific types of *Dushtavrana.*
- Assess Culture sensitivity in other strain of micro-organisms.

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3. तत्रातिसंवृतोऽतिविवृतोऽअतिकठिनोऽतिमृदूरूत्सन्नोऽवसन्नोऽअतिशितोऽत्युष्णः कृष्णरक्तपीतशुल्कादिनांवर्णनामन्यतमव्रणोभैरवः पूतिपूयमांससिरास्नायुप्रभृतिभिः पूर्णः पूतिपूयस्त्रावव्युन्नाग्र्यत्सङ्ग्यमनोज्ञदर्शनगन्धोऽत्यर्थं वेदनावान्दाहपाकरागकण्डूशोफपिडकोपद्रुतोऽत्यर्थं दुष्टशोणितस्त्रावीदीर्घकालानुबन्धीचेतिदुष्टव्रणलिंगानि II सु. सू. 22/7 pg. 108

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4. तिक्ता दारूहरिद्रास्याद् रूक्षोष्णा व्रणमेहनुत I
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5. मधुतुमधुरंकषायानुरसं रूक्षंशीतमग्निदीपनंवर्ण्यं स्वर्यं लघुसुकुमारंलेखनंहृदयवाजीकरणं सन्धानंशोधनंरोपणंसंग्राहिचक्षुष्यंप्रसाधनम् सूक्ष्ममार्गानुसारिपित्तश्लेष्ममेदोमेह

हिक्काश्वासकासातिसारच्छर्दि तृष्णाकृमिविषप्रशमनं ह्लदि त्रिदोषप्रशमनं चः तत्तु लघुत्वात कफघ्नपैच्छिल्यान्माधुर्यात् कषाय्भावाच्चवातपित्तघ्नम् II सु॰सू॰45/132 pg. 207

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Signature of Ph.D. Scholar:

Dr. Rahul Vasantrao Kadam

Signature of Research Guide and HOD:

Prof. Dr. U. A. Vaidya.
HOD,
Department of Shalyatantra
BVDU, College of Ayurved, Pune.

Annexure

Annexure I

A GRADE
Reaccredited by NAAC

Bharati Vidyapeeth Deemed University, Pune (India)
COLLEGE OF AYURVEDA
PUNE-SATARA ROAD, PUNE- 411 043
Telephone: 91 20 24373954 Fax: 20 24365289
Mail-bvucoa@gmail.com

ETHICS COMMITTEE [BVDUCOA-EC]

REF: BVDUCOA / EC/- 186/2013-14 DATE:- 01-06-2013

APPROVAL LETTER OF ETHICS COMMITTEE

To,

Dr. Rahul V.Kadam
Ph. D. scholar,
Department of Shalyatanta
BVDU College of Ayurveda,
Pune

Ref: Project No. BVDUCOA- EC/Ph. D./ SHLY 02

Dear Dr.

Human Ethics Committee reviewed and discussed your application dated 15th March 2013 to conduct the study entitled **The Role of local application of Daruharidra[*Berberis aristata*] and Madhu [Honey] in Dushtavrana shodhana w.r.t. culture sensitivity** during the meeting held on 22nd March 2013.

BVDUCOA/EC/REG-APPLICATION/2013

The following documents were reviewed and approved:

1. Project Submission form.

2. Study protocol (including protocol amendments), dated_____, version no(s).

3. BVDU COA Scientific Review Committee approval letter dated _____

4. Patient information sheet and informed consent form (including updates if any) in English and/Vernacular language.

5. Investigator's brochure, dated_____, version no._____ [as applicable]

6. Proposed methods for patient accrual including advertisement(s) etc. proposed to be used for the purpose.

7. Current CVs of Principal investigator, Co-investigators

8. Package inserts

9. Insurance policy/compensation for participation and for serious adverse events occurring during the study participation.

10. Investigator's Agreement with the sponsor [if applicable]

11. Investigator's undertaking

12. DCGI/DGFT approval? [in case where applicable]

13. Clinical Trial Agreement (CTA)/Memorandum of Understanding (MOU)/Material Transfer Agreement (MTA),[if applicable]

The following members of the Human Ethics committee (IEC) were present at the meeting held on Date 22/3/13 Place BVDUCOA Pune

Sr. No.	Name of member	Position on IEC	Affiliation	Gender
1.	Prof. Dr. V.V. Doiphode	Chairman	President, Rashtriya Shikshan Mandal, Ayurved Rassashala, Karve Road, Pune	M
2.	Prof. Dr. AbhijitB. Patil	Member Secretary Scientific	Head, Dept. of Agadtantra [Toxicology] Principal, B.V.D.U. College of Ayurved, Dhankawadi Pune- 43	M
3.	Prof. Dr. VijayaPandit	Basic Medical Scientist Scientific [members]	Head, Dept. of Pharmacology, Medical College, Bharati Vidyapeeth Deemed University, Katraj-Dhankawadi ,Pune-43	F

4.	Prof. Dr. Mohan Kale	Basic Medical Scientist Scientific	Department of statistics,University of Pune. Ganesh Khind , Pune 411 007	M
5.	Adv. Dr. Milind B. Salunkhe	Legal expert Non- Scientific	3/14, Apate Colony, Sinhgad Road, Hingane. Pune –411051.	M
6.	Vd. Vilas Nanal	Clinician	Gautam Govind society, Sahakar Nagar, Pune	M
7.	Dr. Shamrao Yashawant Kamble	Lay person from the Community	C-7, Laxmi Palace Apartment,Near Gurudwar, Aundh Gaon, Pune- 411 007	M
8.	Dr. AsmitaWele	Internal members	Professor, & Head Dept. of RSBKV [Ayurveda pharmacology] BVDU, College of Ayurved,	F
9.	Dr. Manasi Deshpande	Internal members	Professor & Head of Department Dravyagunavigyan BVDU, College of Ayurved, Katraj-Dhankawadi Campus, Pune 411043	F

The trial is approved in its presented form. The approval is valid until two years from the date of sanction. You may make a written request for renewal / extension of the validity, along with the submission of annual status report.

Following points must be noted:

1. IEC should be informed of the yearly progress of the study.

2. IEC has approved recruitment of ____ patients on this study.

3. PI and other investigators should co-operate fully with supervisor and or head of the concerned department, who will monitor the trial from time to time.

4. The decision was arrived at through consensus. Neither PI nor any of proposed study team members was present during the decision making of the IEC.

5. At the time of PI's retirement/intention to leave the institute, study responsibility should be transferred to colleague after obtaining clearance from HOD, Status report, including accounts details should be submitted to HOD, DSMSC and extramural sponsors.

6. The IEC functions in accordance with the ICH-GCP/ICMR/Schedule Y guidelines till the draft Guidelines [rule 170 schedule Z]for ASU drugs are confirmed.

7. In case of any new information or any SAE, which could affect any study, must be informed to IEC, supervisor and sponsors. The PI should report SAEs occurred for IEC approved studies within 7 days of the occurrence of the SAE. If the SAE is 'Death', the IRB Secretariat will receive the SAE reporting form within 24 hours of the occurrence.

8. In the events of any protocol amendments, IEC must be informed and the amendments should be highlighted in clear terms as follows:

a. The exact alteration/amendment should be specified and indicated where the amendment occurred in the original project. (Page no. Clause no. etc.)

b. Alteration in the budgetary status should be clearly indicated and the revised budget form should be submitted

c. If the amendments require a change in the consent form, the copy of revised Consent Form should be submitted to Ethics Committee for approval.

d. If the amendment demands a re-look at the toxicity or side effects to patients, the same should be documented.

Agenda Preparation, Meeting Procedures and Recording of Minutes Page 119

e. If there are any amendments in the trial design, these must be incorporated in the protocol and other study documents. These revised documents should be submitted for approval ofthe SRC and IEC, only then can they be implemented.

f. Approval for amendment changes must be obtained prior to implementation of changes.

Without including all the above points, the amendment is unlikely to be approved by the Ethics committee.

g. Any deviation/violation/waiver in the protocol must be informed to the IEC.

Thanking You,

Yours Sincerely,

Member Secretary,

Chairman

BVDU COA Ethics Committee

A GRADE
Reaccredited by NAAC

Bharati Vidyapeeth Deemed University,Pune (India)
COLLEGE OF AYURVEDA
PUNE-SATARA ROAD, PUNE- 411 043
ETHICS COMMITTEE[BVDUCOA-EC]
Telephone: 91 20 24373954 Fax: 20 24365289

REF: BVDUCOA / EC/- 1553 /2015-16 DATE:- 27-01-2016

To,

Dr. Rahul Kadam
Ph. D. scholar,
Shalya tantra,
BVDU,
College of Ayurved, Pune

Dear Ph. D. scholar,

BVDU Institutional ethics committee was held on 24th September 2015. Your application for extension of your Ph. D. research work entitled **The roll of local application of Daruharidra (Berberis aristata) and Madhu (Honey) in Dushtravrana shodhan w.r.t. culture sensitivity**, is approved by BVDUCOA- EC committee for maximum two year with effect from 24 September 2015.

Rules and regulations regarding ethics will be same as previous IEC approval letter.

Dr. A.B.Patil
Member Secretary, BVDU COA Ethics Committee

Annexure II

॥ पुष्पं पुष्पं विचिन्वीत मूलच्छेदं न कारयेत्॥

Dr. S. S. Deokule
Prof. & Head
वनस्पतिशास्त्र विभाग
Department of Botany
पुणे विद्यापीठ
University of Pune
गणेशखिंड, पुणे-४११००७ (भारत)
Ganeshkhind, Pune-411007 (India)

पुणे विद्यापीठ
University of Pune

दूरभाष : ०२०-२५६०१४३९, २५६०१४३८
Phone : 020-25601439, 25601438
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इ-मेल : .....@unipune.ernet.in
E-mail : .....@unipune.ernet.in

संदर्भ क्र. : वनस्पतिशास्त्र/
Ref.No. : Bot/

दिनांक :
Date :

AUTHENTIC CERTIFICATE

This is to certify that **Dr. Rahul V. Kadam** student of BVDU'S College of Ayurved, Katraj-Dhankawadi, Pune – 411 043. He has selected research topic for his Ph.D. (Shalyatantra) degree which is a given below –

"The Role of Local Application of Daruharidra and Madhu in Dushtavrana Shodhana w.r.t. Culture Sensitivity"

Under this study the specimens which he has submitted to me for the botanical standardization & authentication were identified & confirmed as:

Drug Name	Botanical name	Name of Family	Parts/ Used
Daruharidra	*Berbaris aristata* DC	Berbaridaceae	Rhizome
Honey (Madhu)	---------- As it is ----------		

The herbal drug samples were submitted in an organ form and are identified as above.The authentication of the drug were done by using the botanical parameters such as Organoleptic/ macroscopic (organ and sense), microscopic, histochemical & phytochemical evaluation. This is for information and necessary action

Dr. S. S. Deokule
Professor & Head
Department of Botany
University of Pune,
PUNE-411 007.

AnnexureIII

A. S. Bhave
Hon. Director

Shikshana Prasaraka Mandali's
Late Prin. B. V. Bhide Foundation
For Education & Research In Chemistry, Ayurveda & Allied Sciences
S. P. College Campus, Tilak Road, PUNE - 411030. India
Tel. : 020 - 24324324. Email :bhidefoundation@rediffmail.com

Date :

Our Reference No: CTL/13-14/B-0121

To,
Dr. Rahul Vasantrao Kadam
Ph.D. Scholar
College of Ayurved, BVUD
Pune.

Drug Provided: **Daruharidra+Honey (Lepa)**

Analytical Details:

Sr. No	Name of the Test	Results
1	Color	Slightly yellowish color semisolid
2	Odor	Faint
3	Taste	Slightly Sweetish
4	Moisture Content	12.38
5	Ash Content	6.24%
6	Acid Insoluble Ash	0.76%
7	Alcohol Soluble Extractive	11.24%
8	Water Soluble Extractive	17.48%
9	Reducing sugars % by mass	41.68%
10	Sucrose Content	5.28%
11	Water Insoluble Contents	1.14%
12	1% pH	6.56

The entire Tests were performed as per the standard methods. In case of any queries, please feel free to contact us back.

For Late Prin. B. V. Bhide Foundation

Mangesh G. Tembhurne.

Late Prin BV Bhide Foundation
for Education and Research
in Chemistry

Pranav
Consultancy Services
A Perfect Solution For Chemical & Microbiological Analysis
Flat No. A - 24, Sukhanagari Society, Near Giriraj Vihar, Bijali Nagar, Chinchwad, Pune 33.
Cell.: 9822865840 E-mail : chem_mangesh@yahoo.co.in

Date: 25/010/2013

Invoice No: BV-0121

To,
Dr. Rahul Vasantrao Kadam
Ph.D. Scholar
College of Ayurved, BVUD
Pune.

INVOICE

Charges Details:

Sr. No	Name of the Test	Rate/test	No. of Sample	Total charges
1	Moisture Content	200	1	200
2	Ash Content	250	1	250
3	Acid Insoluble Ash	250	1	250
4	Alcohol Soluble Extractive	250	1	250
5	Water Soluble Extractive	200	1	200
6	Reducing sugars % by mass	300	1	300
7	Sucrose Content	250	1	250
8	Water Insoluble Contents	100	1	100
9	1% pH	80	1	80
10	Honey Purchase	65	1	65
			Total Amount	1745.00

Total Amount **Rs. 1745/-**(One Thousand seven hundred and Forty five rupees only.)

If the payment is made by the cheque please draws the cheque in favor of **"Pranav Consultancy Services"**

प्रणव कन्सल्टन्सी सर्व्हिसेस करिता

प्रोप्रायटर

IMPORTANT
Above test report cannot be produced as a legal evidence without our prior written permission.

Annexture IV

Abbreviation

- सु. सू. /Su.Su. Sushrut Sutrasthana
- सु. शा. / Su.Sha. Sushrut Sharirsthana
- सु.चि. / Su.Chi. Sushrut Chikistasthana
- सु.नि./ Su.Ni. Sushrut Nidanasthana
- चक्र Chakrapani
- च. सू./ Ch.Sha. Charaka Sutrasthana
- च. शा. / Ch.Sha. Charak Sharirsthana
- च. शा. / Ch.Sha. Charak Sharirsthana
- च. चि./ Ch.Chi. Charak Chikistasthana
- वा.शा. / Va.Sha. Vagbhata Sharirsthana
- वा. उ. / Ch.Sha. Vagbhata Uttaratantra
- अ.ह./ Ash.H. Ashtang Hriday
- अ.सं./ Ash.S. Ashtanga Sangraha
- यो.र. / Yo.R. Yoga Ratnakara
- का.सं./ Ka.Sa. Kashyapa Samhita
- Ath Atharvaveda
- मा.नि./ Ma.Ni. Madhava Nidana
- ध.नि. / Dh. Ni. Dhanwantari Nighantu
- कै. नि. / K. Ni. Kaiyadeva Nighantu
- भा.नि./ Bha.Ni. Bhavprakasha Nighantu
- रा.नि./ Ra.Ni. Raj Nighantu

Annexure V

Culture Sensitivity

A **Culture** is a test to find germs (such as bacteria or a fungus) that can cause an infection.

A **Sensitivity** test checks to see what kind of medicine, such as an antibiotic, will work best to treat the illness or infection.

For a culture, a sample of body fluid or tissue is added to a substance that promotes the growth of germs. If no germs grow, the culture is negative. If germs that can cause infection grow, the culture is positive. The type of germ may be identified using a microscope or chemical tests. Bacteria usually grow quickly in a culture (2 days), while other types of organisms, such as a fungus, can take longer.

A culture and sensitivity test may be done on many different body fluids, such as urine, mucus, blood, pus, saliva, breast milk, spinal fluid, or discharge from the vagina or penis.

How is a Culture and Sensitivity Test Done?

Your rabbit-experienced vet will take a sample of infected tissue or discharge from the infected area (the capsule of an abscess is the best location from which to take a sample, as the internal pus often contains only dead bacteria that will not grow in culture), and send it in a special culture tube to a licensed laboratory for testing.

In the lab, technicians will spread a sample of the infective material onto a plate of nutrient substance (usually agar, a type of gel made from algae) and allow to grow whatever species of bacteria were in the bunny's infected area.

With a sufficient population of bacteria grown on the plate in the form of a "lawn", the technicians will perform two main operations:

1. IDENTIFY THE SPECIES OF BACTERIA.

This is done with various techniques, including examination of lawn characteristics (color, texture, growth pattern, etc.) gram-staining, microscopic examination, metabolic requirement "footprints" and even DNA sequencing.

- Bacterial species commonly isolated from rabbit infections include *Pasteurella multocida*, *Pseudomonas aeruginosa*, *Bordetella bronchiseptica*, *Staphylococcus aureus*, and several others, though just about anything might turn up, depending on the location and cause of the infection.

2. DETERMINE THE BACTERIAL POPULATIONS SENSITIVITY TO A RANGE OF ANTIBIOTICS.

- This can be done by placing small disks of filter paper or agar impregnated with various types of antibiotics onto the bacterial lawn. The bacteria are allowed to incubate for a day or two, and then the plate is examined to see whether the bacterial growth is inhibited (or not) by the antibiotics on each disk.
  - SENSITIVE: In this case, a clear, circular "halo" (technically known as a "plaque," or zone of inhibition) will appear around the antibiotic disk, indicating an absence of bacteria. The antibiotic has inhibited their growth and/or killed them, meaning that this particular antibiotic should be effective against the infection your rabbit has.
  - INTERMEDIATE: A somewhat cloudy plaque indicates that not all the bacteria in the area around the disk have been killed. This means that there are some members of the bacterial population that are sensitive to this particular antibiotic, but others that are genetically immune to its effects. If an antibiotic to which the bacteria show "intermediate"

sensitivity is used, it is likely that the sensitive members of the bacterial population will be killed, and the resistant ones will survive, resulting in the selection of a population resistant to that particular antibiotic.

- RESISTANT: In this case, the filter paper will have no discernable plaque around it, meaning that the bacteria are growing normally, even in the presence of the antibiotic. An antibiotic producing no plaque will most likely be ineffective against the bacteria causing your bunny's infection.
- A more detailed explanation of the appearance of the halos used in bacterial identification), shows bacteria being strongly and moderately inhibited by most of the antibiotics (impregnated on circles of filter paper), but unaffected by the antibiotics on the disks located at 5 o'clock and 9 o'clock on the dish.
- In three to seven days after the sample is taken, your vet will receive the results from the lab, including the species of bacteria and the range of antibiotics to which the bacteria are sensitive (S), resistant (R) and intermediate (I). Again, "sensitive" means that the bacteria were inhibited or killed by that particular antibiotic, and this is what you want to hear.

Culture Sensitivity procedure:

Following procedure had been followed for the test-

A) Preparation of culture media:

Most culture media are available commercially readymade dehydrated form. To ensure good performance and reproducibility in the results the following must be performed correctly:

- Weighing and dissolving of the ingredients
- Addition of heat sensitive material
- Anything used for preparing culture media should be free from living organism.

- All media prepared should be sterlized.
- Sterility testing and quality control
- Ph testing- Most organism grows at slightly alkaline Ph (7.2-7.6).
- Storage.

❖ **Nutrient Agar-**

Agar is a long chain polysacchride substance from certain seaweeds. It forms a firm gel in watery solution at concentrations at about 2%. Agar alone has no nutritive properties. It melts at about 95^0 C. and solidifies only when cooled.

To the nutrient broth add 2% of agar it then becomes nutrient agar. After addition of 2% agar autoclave at 15lb for 20 minutes.

B) Inoculation of pus/slough/discharge:

Place a loopful of inoculum near the periphery of the plate and cover approximately ¼ of the plate with close parallel streaks. Flame the loop and allow it to cool.

With a loop spread the inoculum over the upper portion of the plate.

C) Incubation of the culture:

1) Inoculated media should be incubated as soon as possible to protect viability of pathogens and also dust contamination.
2) It should be kept away from sunlight.
3) For the most of the organism, the optimum temperature used for incubation is 35-37^0 C.
4) Very dry atmosphere can affect the growth and viability of many pathogens such as gonococci.
5) Aerobes require free oxygen. Facultative anaerobe can grow with or without free oxygen. Anaerobes are unable to survive in an atmosphere containing oxygen.

6) See the growth of organism after 24 hrs.

D) To check the sensitivity -- through medicine:

After the growth of micro-organisms – to check the sensitivity through aqueous extract of *Daruharidra* (*berberis aristata*) and *Madhu* (Honey) in the ratio 1:2.

Annexure-VI

INFORMED CONSENT FORM

1	I confirm that I have read and understood the Participant Information Sheet dated ……for the above study and have had the opportunity to ask questions and am satisfied with the responses received.
2	I understand that my participation in the study is voluntary and that I am free to withdraw at any time from the study without giving any reason and without affecting my medical care or legal rights.
3	I understand that the researcher /others working on behalf of the researcher, the Ethics Committee and the regulatory authorities will not need my permission to look at my records, both in respect of the current study and any further research that may be conducted in relation to it. Even if I withdraw from the study, I agree to this access. However I understand that my identity will not be revealed in any information related to third parties or publications.
4	I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s).
5	I consent voluntarily to participate as a participant in the above research study.

Name of participant:	**Signature of participant:**
Signature of Candidate :	**Signature of the Guide:**
Witness:	**Date:**

संमतीपत्रक

मी खाली सही करणार

श्री/सौ.

.....वय...

.....वर्षे

लिहूनदेतो/ देतेकी डॉ राहुल कदम यांच्या अनुसंधान प्रबंधा मध्ये सहभागास माझी पुर्ण तयारीआहे. मी या संशोधन प्रकल्पामध्ये स्वतःहून सहभागी होत असुन माझी तपासणी आणि उपचार करण्यास परवानगी देत आहे.

प्रकल्पामध्ये होणा-या परिणामांची मला डॉक्टरांनी पूर्ण कल्पना दिली आहे आणि त्यासाठी माझी तयारी आहे. मी कोणत्याही आमिषाला किंवा दडपणाला बळी न पडता मला संशोधन प्रकल्पात सामिल करून घेण्यास परवानगी देत आहे.

दिंनाक ःसही/ अंगठा
साक्षीदारः

Annexure-VII

CASE STUDY

Rugna pariksha patrakam
B.V.M.F's. AYURVED RUGNALAYA
SHALYATANTRA VIBHAG
PUNE - 411043.

Name of Patient – **Date**:-

Age - **Sex** –

Address –

Ph no. (if any):-

Occupation –

OPD No.- **IPD No**. –

Chief complaints (Vedana vishesh) –

History of present illness (Vartaman vyadhi vritanta) –

History of past illness (Poorvotpanna vyadhi) –

Family History (Kulavritanta) –

Samanyaparikshana –

T -
P -
R -
BP-

Nadi –
Mala –
Mutra –
Jivha –
Shabda –
Sparsha –
Drik –
Aakriti –
Built –
Attitude –
Mental state –
Nutrition –
Decubitus –
Clubbing –
Cyanosis –
Pallor –
Jaundice –
Lymphadenopathy –

STHANIK PARIKSHAN –

Darshana–

Slough –

Discharge –

Redness –

Sparshana –

Local temperature –

Induration –

Dimensions –

Tenderness –

Prashna –

Pain –

Aakriti –

Photograph –

Day 0 –

Day 4 –

Day 7 –

Day 10 –

Day 13–

Day 15 –

Any other important condition noted:

SrotasParikshana –

Rasavaha –

Raktavaha –

Mansavaha –

Anya srotasparikshana –

<u>Prayogshaleyaparikshana</u> –

Culture sensitivity-

-Haemogram with ESR –

-B.S.L. F – PP-

-Urine – (R) –

(M) –

HIV -

Nidana –

Hetu–

Purvarupa –

Lakshana	**Day 0**	**Day 04**	**Day7**	**Day 10**	**Day 13**	**Day 15**
A. Sthanik						
1. Srava						
2. Varna						
3. Gandha						
4. Ushma						
5. Akruti						
6. Araktata						
7. Vedana						
8. Vranavastu						
9. Induration						
B. Sarvadehik						
1. Jwar						
C. Anya Lakshana (if any related)						

Sign of Candidate- **Sign of Guide-**