Chapter 6. Discussion

1. Prevalence of Diabetes:

As mentioned in Ayurveda causes of the Prameha are also seen in DM2. The main cardinal symptom of Prameha i.e. increased frequency of micturition, trishna, sweating, burning sensation and sweetness in mouth (M.ni. Pramehanidan 33/5-6)\(^{328}\) is correlating with DM2. As the hetu’s mentioned in classics (M.ni. Pramehanidan 33/1 \(^{329}\) are increasing in day to day life style of current era. So ultimately the incidence of Prameha will also increasing. Prameha is also mentioned as Ashtomahagada; i.e. eight difficult diseases to treat, as prognosis of the disease are worst. (Su.Su.33/4-5).\(^{330}\)

2. Prevalence of Ulcer in Diabetes:

In a study to determine prevalence of diabetic foot in India, the prevalence of infection noted was 6-11% and prevalence of amputation was 3% in type 2 diabetic patients due to nutritional poverty, lack of medical awareness about the diabetic ulcer. The patients could not able to recover his ulcer in time, so these ulcers land into chronic nonhealing ulcers. The fate of nonhealing ulcer is amputation or death.

Sushruta mention incidence of Asadhya Vrana in Madhumeha (Su.su.23/7)\(^{331}\) Prameha is also mentioned as Ashtomahagad.e. eight difficult diseases to treat, as prognosis of the disease are worst. (Su.Su.33/4-5).\(^{332}\)

3. Prameha and Prameha Pidika:

In uncontrolled Diabetes vitiated vasa and meda with tridosha get aggravated and forms various types of Pidika type of Nij Vrana (Su.Ni.6/14),\(^{333}\) in which line of treatment should be done as per type of Diabetes. (Su.Ni.6/9)\(^{334}\). Treatment of immature pidika is like shoph, and pakwapidika is like Vrana (Su.Chi.13/9).\(^{335}\)
4. Chronic Ulcers and Dushta Vrana:

Concept of Dustha Vrana and chronic ulcer is very well correlating (Su.Su. 22/7). Charak and Sushruta have mentioned details of Ulcers in Vrana chapter, which are discussed in detail in Review of Vrana chapter.

5. Discussion on initial attributes of chronic ulcer:

1. Site of Ulcer:

The incidence of Ulcer site in present study was found more in lower and upper extremities of body which is due to stagnation of the blood against gravity. Same description was found in classics (Su.Chi.13/8). This explains due to incompetence of Ras-Raktavaha Dhamani vitiated Ras, Pitta and Kapha get accumulated in extremities part of body. These ksheenRas-Raktta dhamani is not able to carry dosha in koshta. So, the Dosha get Adhogati and accumulate in shakha, which forms ulcer in extremities. Workers have maximum chances of injury to extremities. Offloading techniques to avoid pressure on ulcer plays important role in healing.

2. Chronicity:

In correlation matrix graph we have observed, the grade of Ulcer, hospital stay, size, shape, healing outcome, pain, secretion, smell, and granulation is dependent on chronicity of Ulcer. As the chronicity increases the disease prognosis and grade of ulcer is also increases. The local, systemic damage and defense are also affected. This increases the chances of non-healing Vrana in Madhumeha and it is mentioned as difficult to treat. (Su.Su.23/7) All diseases Asadhya after 1 year Chronicity. (Su.Su.10/6). In Sadhyasadhyatwa Jirnavyadhi is also mentioned by Sushruta (Su.Su. 23/3,4,5,6,8).

3. Age:

In correlation matrix graph we have observed, as the age increases the possibility of non-healing is also increases. As in senile age the recovery is slow due to reduce immunity and reduce production of essential nutrients and cells. In Sadhyasadhyatwa of Vrana the old age is mentioned as difficult to treat in Sushruta Samhita (Su.Su. 23/3, 4, 5, 6).
4. Gender:

In correlation matrix graph we have observed, in male population the incidence of non-healing is more. The selection of cases is on willing and random criteria. So, we have not any evident data to explain this finding. One of reason may be the working stylein male dominating culture in this region, as more male are workers. Workers have maximum chances of injury.

5. Occupation:

In analysis of occupation graph and table we have observed, workers are more in numbers. One of reason may be the working style and male dominating culture in this region. So, more male are workers. Workers have maximum chances of injury also the nutrition is also not balance in them. The health awareness in these people is also low.

6. Hospital stay:

In correlation matrix graph, we have observed as the age, size of ulcer, BSL, chronicity all these increases the rate of healing is delayed. As the healing is delayed the hospital stay of patients is also increases.

7. BSL:

In correlation matrix graph we have observed, as the BSL level is increases the size of ulcer, chronicity, hospital stay are increases. As age increases then BSL level also increasing. In the prognosis of Diabetic Ulcer BSL control has direct effect on healing. The uncontrolled BSL level worse the pathology and increases complications. We have already discussed in Pathophysiology of Diabetic Ulcer.

8. Initial size of ulcer:

Minimum size in group A is 11sq/cm and in group B is 4sq/cm. It is an accidental finding due to sampling method. Maximum size is same. Most of patients from both group are in between 20-60 sq/cm. In correlation matrix, the larger size has direct relation with age, chronicity, hospital stay, BSL level. The cause may be larger size of ulcer have maximum exposure area for infection, trauma, need more nutrient, reduced
immunity due to chronicity. This delays healing of ulcer. The non-healing tendency increases size of Ulcer.

9) Ulcer Grade:

Maximum patients of grade I ulcer are found in this study. The selection of cases is on willing and random criteria. Secondly only grade I and II ulcers are selected in this study. As grade III and grade IV ulcer need different treatment protocols and they are difficult to heal. So, they are excluded to avoid healing bias in study. So, we have not any evident data to explain this finding. Only early intervention for treatment after incidence of ulcer. As the mean chronicity for group A and B is 16.9 weeks and 16.47 weeks respectively. Sushruta has mention correlation of the site of ulcer and its severity according to Vrana-dhatugata adhisthan and its sadhyasadhatwa Su.Su.22/3.342

The t-test results are non-significant for initial parameters. So, we can say that groups equal for comparison are randomly assigned. No sampling bias is there.

6) Healing Parameters:

i) Size: In this study, we have minimum size is observed in pressure ulcer area of heel. These ulcers are very difficult to treat. While a patient is walking, his ulcer gets pressure effect and the less vascularity in this region. The maximum size is observed on anterior and posterior aspect of leg, sole area, and few gluteal areas. This is because of Chronicity of ulcer and most of patients have associated cellulitis in initial phase. The size of wound is directly proportion to age, chronicity, BSL level, nutrition, and infection.

ii) Shape: In Sushruta Samhita Su.Su.22/5343 four shapes are mentioned. Among them we have not observed Tripatak and Shesh shape in this study, as the sample size is limited. The original shape changes at the end of healing day’s. As the oval and circular shapes remain till the end. Only irregular shape changes fast, changes to oval shape.

iii) Secretion: Maximum patients have grade 3 i.e. Hemosanginious and Grade 4 pus secretion initially. This is because all are chronic ulcer. Heavy infected ulcer shows pus discharge and unhealthy granulation and infected ulcer shows hemosanginious
discharge. This discharge is very well correlating to Sushruta’s vran-stravamention in Su.Su.22/8. The secretion shows gradual reduction in both groups.

iv) Smell: In Sushruta Samhita the details of Strava according to Dosha is given at Su.Su.22/10. But for practical and gradation purpose we have selected 4 grades. They are very well correlating to Sushruta. As the ulcer start healing the amount and quality of smell also decrease. The smell shows gradual reduction in both groups.

v) Granulation: In Sushruta Samhita the details of Granulation according to Dosha is given at Su.Su.22/7,12. He has mention various colour of Ulcers, but for practical and gradation purpose we have selected 4 grades. They are very well correlating to Sushruta. As the ulcer start healing the amount and quality of granulation is also improves. The granulation shows gradual improvement in both groups.

vi) Pain: The gradual and regular decrease in pain is observed in both groups. Only first 20days observation of Ayurved treatment group is showing little but fast decline in pain than group B. This may be due to early control of Vata dosha by drugs. The description about pain in Sushruta Samhita is in detail than modern science Su.Su.22/11.

vii) Ulcer bed: In Sushruta Samhita the details of Ulcer bed colour according to Dosha is given at Su.Su.22/12. He has mentioned various colour of Ulcers. But for practical and gradation purpose we have selected 4 grades. They are very well correlating to Sushruta’s information. As the ulcer start healing, the amount and quality of Ulcer bed is also improves. The Ulcer bed colour shows gradual improvement in both groups.

Chi-square test has non-significant result. The test is applied on pulled table to maintain continuity or accuracy, the pulling is done for major and minor amputation in to Contraction without Epithelization as frequency in both categories is less than 5 each. Single proportion test, we sum up all completely healed patients and compared with sum of all non-healed patients. The test is significant so we can conclude that both A and B treatment groups are 83.46% effective and 16.53% cases are non-healable with A or B treatment.

The control group B is already accepted and proven treatment protocol for Ulcer in the Modern medicine. So we can conclude that both groups are equally effective for the Ulcer treatment.
7. Possible mode of action of Nimbadi Kalka: 349-53

The Guna, Rasa, Veepak and Virya which normalize the vitiated dosha are given below.

1) **According to Dosha Guna:**

**Table No. 86: Dosha Guna, Ras, Veepak and Veerya correlation:** 350

<table>
<thead>
<tr>
<th>Dosha/ Guna</th>
<th>Guna</th>
<th>Rasa</th>
<th>Veepak</th>
<th>Virya</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vata</strong></td>
<td>Ushna-DaruwaridraTila, Snigdha-Tila, Yashtimadhu Ghruta, Sukshma-Tila Guru-Yashtimadhu Ghruta Mrudu-Yashtimadhu Ghruta</td>
<td>Madhur- Yashtimadhu, Ghruta, Tila, Madhu</td>
<td>Madhur- Yashtimadhu, Ghruta, Madhu</td>
<td>Ushna- DaruwaridraTila</td>
</tr>
<tr>
<td><strong>Pitta</strong></td>
<td>Snigdha-Tila, Yashtimadhu Ghruta, Sheet-Yashtimadhu Ghruta, Guru-Yashtimadhu Ghruta Mrudu-Yashtimadhu Ghruta</td>
<td>Madhur- Yashtimadhu, Ghruta, Tila Madhu Tikta- Nimba, DaruwaridraTila Kashaya- Tila Madhu</td>
<td>Madhur- Yashtimadhu, Ghruta, Madhu</td>
<td>Sheet- Nimba, Yashtimadhu, Ghruta, Madhu</td>
</tr>
<tr>
<td><strong>Kapha</strong></td>
<td>Ushna-DaruwaridraTila, Rukshya-Daruwaridra Madhu Sukshma, tikshna-Tila Laghu-Nimba, Madhu Khara-Madhu</td>
<td>Tikta- Nimba, DaruwaridraTila Katu- DaruwaridraTila Kashaya-Tila Madhu</td>
<td>Katu- DaruwaridraTila</td>
<td>Ushna- DaruwaridraTila</td>
</tr>
</tbody>
</table>
2) According to Rasa:

a) Tikta rasa: Nimba, Daruherida and Tila are acting as vishaghna (nullifies the toxic effects), krimighna (anti-bacterial), dahapramshama (reduces burning sensation), kushtaghna (skin disease modifying agent), mansasthirakara (enhances granulation), deepana-pachana-shodhana (local tissue metabolism regulator), lekhana-chedana (debridement), and kledashoshana (absorb the unwanted secretion). With the effect of Ruksha property it works as Kleda-meda-lasika and puya (Pus) upashoshana.

b) Katu rasa: Daruherida acts as Kledahar (Reduces unwanted sticky secretions), kanduhara (anti-pruritic), krimihar (anti-bacterial), strotovivarana (enhances microcirculation and micro channels), shodhana (local tissue metabolism regulator), vishahara (nullifies the toxic effects), kushtahara (skin disease modifying agent), shwayathuvinsashana (anti-inflamatory), shonitasanghatabheda (anti-coagulant) property which is necessary for wound healing it happens due to teekshna property of this drug.

c) Madhuraraasa: Yashtimadhu, Tila, Ghruta and Madhu act as vishaghna (nullifies the toxic effects), dahashamana (reduces burning sensation), twachya (skin tissue immune modulator, preenana (regulates, jeevana, tarpana, brimhana,ksheenakshatahitakara and sandhanakara (enhances healing stages) due to snigdha, sheeta, guru properties of these drugs.

d) Kashaya rasa: Madhu and Tila acts as sandhankara, ropana, shoshana, peedana, stambhana, raktaprashamana, kleda-medashoshana, lekhana and twakvarnyakara due to rukhsh, laghu, sheeta and khara properties of these drugs.

3) According to Guna:

e) Guna of Nimbadi kalka and its action:

1. Guru--This guna is essential for Bruhan of mamsa and other dathu. This is present in Yashtimadhu, Tila and Ghruta. This is helpful for Granulation and wound healing.

2. Laghu-- Langhan essential for pachan. It is Ropak, Vatkar, Khaphaghana. This is present in Nimba, Madhu. This is helpful in debridement.

3. Sheet—This guna has Stambhan property. It is Dhatuvrdhikar, Dahashamak,Vat-pittahar, Kaphvrudhikar, Bruhan, Rakttasthamban. This is helpful for Granulation and wound healing. It also stops bleeding, Dhatupakand burning sensation. This is present in Nimba, Yashtimadhu, Madhu and Ghruta.
4. **Ushna**--This guna has Swedan property. It is Pachak, Dahak, and Vat-Khaphahar. This is helpful in debridement, which is present in Daruheridra and til.

5. **Snigdha**-- This guna has Snehan property. It is Vathar, Kaphahar, Balya, Rasayan, Bruhan, Snehan, Mardavkar. This is helpful for Granulation. This is present Yashtimadhu, Ghruta and Til.

6. **Ruksha**-- This guna has Rukshan property. It is Vatkar, Kaphahar, Shoshak, Sthambak, and Khar. This is helpful for debridement and to stop excess secretions in Ulcer. This is present in Daruheridra and Madhu.

7. **Mrudu**-- This guna has Shlathan property. It is Vathar, Kaphakar. This is helpful for Granulation by providing moist and oily environment to Ulcer. This is helpful for Granulation. This is present in Til and Madhu.

8. **Teekshana**- -This guna has Shodhan property. It is Kaphahar, Pittakar, Dahan, Pachan, and Lekhan. This is helpful for debridement and to stop excess secretions in Ulcer. This is present in Daruheridra and Til.

9. **Vishad**--This guna has Skhalan property. It is Picchilnashak, Lekhan. This is helpful for debridement and to stop excess secretions in Ulcer. This is present in Daruheridra and Tila.

10. **Khara**- This guna has Lekhanproperty. It is kaphahar, Vatkar. This is helpful to stop excess secretions in Ulcer. This is present in Daruheridra and Madhu.

Sukshma- This guna has Veevaran property. This is helpful to propagate the drug at micro Chanel and cellular level. This is present in Tila.

11. **Drava**- This guna has Sandhan and Veelodan property. This is helpful to propagate the drug on Ulcer area. This is present in Madhu.
f) Various Karma of Nimbadi kalka for Vrana Ropan and Shodhan:350-52

After studying various references from Samhita and Nighantu the drug Nimbadi kalka has following Karma mentioned for Vrana Shodhan and Ropan in it.

Table No.87: Various karma of Nimbadi kalka

<table>
<thead>
<tr>
<th>Karma/Drug</th>
<th>Daruharidra</th>
<th>Nimba</th>
<th>Yashti</th>
<th>Tila</th>
<th>Madhu</th>
<th>Ghruta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vrana</td>
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<td>+</td>
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<td>Shotha</td>
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<td>Ruja</td>
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<tr>
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<td>Vatraktta</td>
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<td>+</td>
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</table>
8 Corelation of Karmas of Nimbadi kalka Gunapanchak with Modern science. 350-53

- **Antimicrobial activity**: Krumighana, Vishahara, Shodhan, Pachan, Jwaraghana.
- **Anti-inflamatory**: Shothaghna, Shodhan, pachan, Jwaraghana, Vishahara, Rakttadosh.
- **Debridement**: Shoshan, Kledaghana, Lekhan, Deepan, Pachan, Shothaghna, Shodhan, Jwaraghana, Vishahara, Rakttadoshjeet.
- **Circulation**: Tarpan, Shodhan, Astraieet, Rakttapitahar.
- **Nutrition**: Shodhan, Bruhan, Mansavruddhikar.
- **Disease modifying**: Mehagghna, Kushtaghana, Kandughna, Vranajeet.
- **Immune modulator and growth factor enhancer**: Rasayan, Jeevaniya, Bruhan, Shukral.
- **Soothing and moistening agent**: Snehan, Cledan, Tarpan, Sheet, Dahashaman, Drava

9. Apptavachan:


Ahstanga Nighantu, Dhanvantri Nighantu, Shodhal Nighantu, Kaiyadev Nighantu, Raj Nighantu, Bhavprakash Nighantu, Nighantu Adarsha. In these Nighantu the Vranahar activity is mentioned. This is discussed earlier in drug review and probable mode of action of drug.

In this way, the activity of Nimbadi kalka for Chronic Diabetic Ulcer is justified. 10.

10. Failure of cases:

As we see in correlation matrix graph healing of Ulcer is directly proportional to age, chronicity, BSL control, initial size of ulcer.

The patients underwent for minor and major amputations have age above 70 years. Chronicity of Ulcer above 25 weeks. BSL is not in total control. Initial ulcer size is
above 70 sq/cm. All these parameters are on higher size in groups. The Dosha Dhatudushti is more. So these patients underwent for amputation to save their life. Same explanation about non-healing of Ulcer are mentioned in Sushruta Samhita Su.Su.10/8, Su.Su.23/3, Su.Su.23/11, Su.Su.23/17. This is earlier discussed in initial attributes.

11. Untoward effect study:
In Ayurved treatment group, no any untoward effect is observed in patient treated with ayurved treatment.