



## Research Article

### STUDY OF EFFICIENCY OF *GUDUCHI PRATAN* (*TINOSPORA CORDIFOLIA* TENDRILS) AS HERBAL SUTURE MATERIAL IN *TWAK SIVAN KARMA*

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#### ABSTRACT

Wounds are the commonest problem faced by surgeon. Good approximation with good post-operative healing is the main aim of suturing of such wounds. Therefore many advancements in suture materials are done and being done in suture materials. Considering description in Ayurvedic texts like *Surshrut Samhita*, we can say that *Sushruta* has described various suture materials in detail. Also *Sushruta* has described proper techniques of suturing in detail. Modern suture materials are useful in today's era, but when we go through suture materials described by *Sushruta*, all are of natural origin. When we see towards modern suture materials, many of these are also from natural origin like intestine of goat, jute fibers etc. So considering these points a suture material described by *Sushruta*- *Guduchi pratan* was taken for study in view of testing its efficiency and whether it exhibits any medicinal property to wound. For these study effects were compared with Linen as this is also a poly filament suture material. Total 60 patients 30 in each group were taken for study and efficiency of both suture materials were assessed with criteria like Edema, Color, Temperature, Tenderness, and Discharge. Efficiency of *Guduchi Pratan* was found equal to Linen with extra benefit of faster wound healing due to anti-inflammatory and antibacterial property of *Guduchi*.

**KEYWORDS:** Suture material, Herbal Suture Material, *Guduchi Pratan*, *Sivan Karma*, *Chinna vrana*.

#### INTRODUCTION

Wounds are one of the first medicinal problems faced by man since his very existence. As long as human has treated the wounds we have looked for the way to close them. When we go through past history of surgery we come to a conclusion that Indian surgery was considerably ahead of any other early civilization and it can be assumed that much of Arabic, Babylon, Egyptian and Greek surgery techniques originated in India<sup>1</sup>

*Sushruta*, "The father of surgery" and *Dhanvantari*- "The God of surgery" is accepted by all the medicine pathies. In spite of this, some very basic fundamentals mentioned in *Ayurvedic* classics are not followed and practiced in *Ayurvedic* surgery.

There is no adequate reason behind why herbal material like *Guduchi Pratan* described in *Sushruta Samhita* is not used as a suture material in day to day practice. The reason behind this seems to be the heavy impact of modern suturing materials.

Suturing is an important skill for medical students to learn and *Acharya Sushruta* has described this technique in detail below the *Ashtavidha shastrakarma* i.e. eight types of surgeries, among which

*Seevan Karma* (Suturing) i.e. suturing is one of them. While describing *Seevan Karma*, along with technique, indications, contraindications, complications, *Sushruta* has explained different types of suture materials. So one of the suture material described by *Sushruta* was taken for study. When latest suture materials are considered, we find many excellent suture materials available for suturing. All these suture materials are made considering, the approximation of the wound edges and less tissue reaction<sup>2</sup>. But these materials only provide mechanical support to wound edges and not any research has been done to add medicinal properties to suture material, which can help to fasten the wound healing process and will help to decrease the scar formation after healing. Therefore, the topic was selected considering medicinal properties of *Guduchi Pratan* (Tendrils of *Tinospora Cordifolia*) may probably help in good wound healing.

#### Aims

- To assess the efficacy of "*Guduchi Pratan*" for suturing as described in *Sushruta Samhita*

## Objectives

- To study approximation made in *Seevan Karma* (Suturing) by "*Guduchi Pratan*."
- To evaluate any side effect of *Guduchi Pratan* in *Seevan Karma*.
- To observe the nature of scar formation after wound healing.
- To assess tensile strength & flexibility of *Guduchi Pratan*.
- To observe effect of different preservative materials on *Guduchi Pratan*.

## Literary Review

*Sushruta* has given prime importance to wound (*Vrana*), its types and its management as *Shastrakarma Vaidya* always come across such problems. While describing types of wound *Sushruta* explained six types of *Vrana* (wound).<sup>3</sup>

Out of which symptoms of *China vrana* resembles with CLW wound described by modern medicines.

*Sushruta* has described *Ashtavidha Shastrakarma*, i.e. eight types of *Shstra karmas* (Surgical Techniques) out of which *Sivan karma* is sixth *shastrakarma*.<sup>4</sup>

*Sushruta* has explained four types of *Sivan karma*<sup>5</sup> (suturing techniques).

Also *Sushruta* has described different types of suture materials like *Murva*, *Guduchi Pratan*, Hair, *Snayu* (Tendons) etc. Out of which *Guduchi pratan* (tendrils of *Tinospora Cordifolia*) was taken for study<sup>5</sup>.

## Drug Review

### Guduchi

**Botanical name** – *Tinospora cordifolia*.

- *Tinospora* – To stretch like a Bow
- *Cordi-Kardium-Heart folio-leaves*.<sup>6</sup>

**Family** – Menispermaceae

- *Meni-moon*, sperm (seed) → moon like seed

### Origin of Guduchi

According to mythological description in *Bhavaprakash*, *Guduchi* is originated from the *Amruta* given by God *Indra* to *Vanar Sena* of *Rama*.

### Parts used

Root, stem and leaves.

- *Rasa* – *Tikta, Katu, Kashaya*
- *Virya* – *Ushna*
- *Vipaka* – *Madhura*
- *Prabhav* – *Rasayana, Pramehanashaka*
- *Vataraktanashaka, Hridrognashaka*<sup>7</sup>

## Medicinal and Pharmacological activities of Guduchi<sup>9</sup>

### a) Anti-infective activity

The antibacterial activity of aqueous extract of *Tinospora cordifolia* against *E-coli*, *Proteus vulgaris*,

*Enterobacter faecalis*, *Salmonella typhi*, *Staphylococcus aureus* were tested using disc diffusion assay → significant antibacterial activity against all test organisms

An ether extract of stem was shown to inhibit the invitro growth of *mycobacterium tuberculosis*

### b) Anti-inflammatory activity

An aqueous steam extract of *Tinospora Cordifolia* significantly inhibited the acute inflammatory response evoked in rats.

An aqueous steam extract of *Tinospora Cordifolia* was also shown to exert a significant anti-inflammatory effect in both cotton pellet induced granuloma and formalin induced arthritis

Along with these properties *Guduchi* also possess

- Anti-pyretic effect
- Anti-stress effect
- Anti-allergic effect
- Anti-neoplastic effect

## Materials and Methods

The Study was conducted in Sane Guruji Arogya Kedra of Sumatibhai Shah Ayurved Mahavidyalaya, Malwadi Hadapsar, Pune. Efficiency of *Guduchi Pratan* (*Tinospora cordifolia* tendrils) in *Twak Seevan* (suturing over Skin) was assessed by study in the patients with *Chhinna Vrana* (Incised wound / contused lacerated wound – CLW).

For this purpose clinical study was carried out mainly into following phases.

- Preparation of *Seevan Dravya* (suture material).
- Selection of patients.
- Surgical procedure (suturing).
- Assessment of sutured wound and suture material.

### Preparation of Seevan Dravya (Suture material)

*Guduchi Pratan* was collected from Botanical garden of Sane Guruji Arogya Kendra of Sumatibhai Shah Ayurveda Mahavidyalaya, Hadapsar, Pune.

Identification of *Guduchi Pratan* was done by Indian Drug Research Association and Laboratory, Shivaji Nagar, Pune. (Report No – 30, Date – 21/2/2008)

As *Guduchi Pratan* has not got the sufficient tensile strength when used as it is, it was necessary to process the *Pratan* so as to increase its tensile strength and knotting strength.

The *Guduchi Pratan* was preserved in different materials and assessed for its tensile and knotting strength. The preservative materials used were

1. Oil (*Tila Taila*)
2. Glycerin

### 3. Lysol. (Benzalkonium chloride)

These three samples were tested for their physical characteristics like

- a. Diameter
- b. Tensile strength (knot pull tensile strength)

These tests were performed in Suture material manufacturing company- Sutures India at Bangalore.

#### a. Diameter

The diameter of *Guduchi Pratan* was measured with the help of device – Mitutoyo Dial Gauge. Sample of *Guduchi Pratan* preserved in three different materials were taken and kept over the envial of device and pressure foot lowered gently until its entire weight rests upon the *Pratan* and readings were noted.

The diameter of *Guduchi Pratan* was measured at five different sites and the average diameter was calculated.

#### b. Knot – Pull tensile strength →

The knot pull tensile strength of *Guduchi Pratan* was measured on the device – ‘motor – driven tensile strength testing machine; using the principle of constant specimen – rate – of – load, having suitable clamps for holding the specimen firmly. (According to USP standards)

For determining the knot pull tensile strength, sample of *Guduchi Pratan* from different preservative materials were tied into a surgeon’s knot with one turn of suture. The specimen was placed in the testing device with the knot approximately midway between the clamps. The force was exerted by starting the device and applying the pull at the constant rate, and the readings where *Guduchi Pratan* got braked were noted.

#### Selections of patients

Patients having *SadyoVrana* of *Chhinna* variety (incised wound/contused lacerated wound – CLW) were selected from O.P.D/I.P.D. departments of ‘*SaneGuruji Arogya Kendra*’ of ‘*Samatibhai Shah Ayurved Mahavidyalaya*’, Malwadi, Hadapsar, Pune.

The Patients were given detailed information of research project and informed witnessed written consent was taken from those who volunteered to participate.

Subjects having *SadyoVrana* of *Chhinna* Variety (Incised wound) i.e. the wound having following signs and symptoms.

- *Shuddha* (Uninfected) *Vrana*
- Volunteering to participate and give informed written consent.
- Patients of either gender and any age group.

#### Exclusive Criteria

The *Vrana* contraindicated for suturing as per *Sushruta*<sup>10</sup> – *Sutrasthan* – 25/7

- *Kshar*, *Agni*, *Visha Dushta*, *Antargat Shalya yukta Vrana*.
- *Vrana*, having history of more than 6 hours.
- *Vrana* involving underlying structures like Nerves, Tendons etc.
- *Vrana*, very near to vital organs, e.g. eye etc.
- Known cases of Diabetes.
- *Vrana*, near to Joints.

#### Withdrawal Criteria

Suture were removed under guidance of Guide if

- Any acute side effect was noted during follow up. e.g. contamination of *Vrana*.
- Patient not willing for continuing treatment.

Base line pulse, blood pressure, temperature, respiratory system were examined and noted. After clinical examination 60 participants were selected for trial and divided into groups viz.

#### Experimental Group - Group A

**In which the *Vrana* (wound) was sutured with *Guduchi Pratan***

#### Control Group - Group B

In which the wound was sutured with Linen Suture.

#### Surgical Procedure (*Seevan Karma*)

Regular suturing instruments required for suturing were used for procedure. (Needle holder, cutting curved needle, Forceps, scissors).

- Inj. Lignocaine sensitivity test was performed in each patient prior to actual procedure.
- Local Anaesthesia was given at the site of the wound with Inj. Lignocaine 2%.
- Suturing of *Twak gata Vrana* was done with *Guduchi Pratan* in 30 patients and with Linen Thread in 30 patients.
- Appropriate dressing was done with betadine (Povidine Iodine)
- All other concomitant therapy, Antibiotics and Analgesics medicines were given in patients of both group.

#### Assessment

Regular follow-up of patient was taken on 3<sup>rd</sup> day, 5<sup>th</sup> day, 7<sup>th</sup> day for assessment of *Vrana* and *Guduchi Pratan*.

In some patients *Vrana* was examined on 15<sup>th</sup> day, 30<sup>th</sup> day and 60<sup>th</sup> day to observe the scar formation after wound healing and photographs of healed wound were taken.

**Assessment Criteria**

- Edema
- color
- temperature
- tenderness
- discharge

**Gradation of score**

**a. Edema**

| Score | Symptoms   |
|-------|--|
| 0     | : No edema   |
| 1     | : Minimal edema with slight red color.   |
| 2     | : Suture line swelling with pain & redness.  |
| 3     | : Suture line swelling more than 1 cm, which resist touching & with reddish angry look |

**b. Color**

| Score | Symptoms              |
|-------|-----------------------|
| 0     | : Normal pigmentation |
| 1     | : Slight red          |
| 2     | : Light red           |
| 3     | : Slight red          |

**c. Temperature**

| Score | Symptoms   |
|-------|--|
| 0     | : Normal   |
| 1     | : Mildly raised than normal                                |
| 2     | : Raised than normal with severe tenderness and Hyperaemia |
| 3     | : Hot  |

**d. Tenderness**

| Score | Symptoms                                      |
|-------|---|
| 0     | : Tolerance to pressure                       |
| 1     | : Little response to sudden pressure.         |
| 2     | : Wincing of face on superficial slight touch |
| 3     | : Resist to touch.                            |

**e. Discharge**

| Score | Symptoms  |
|-------|---|
| 0     | : No discharge, dry dressing.                         |
| 1     | : Occasional serous discharge & little wet dressing.  |
| 2     | : Often Scanty discharge, needs daily dressing.       |
| 3     | : Profuse continuous discharge, which needs frequent. |

**Criteria For Assessment of Total Effect**

**1. Completely healed-** Appropriate apposition and complete union of wound edge along the entire length of wound, without any signs of inflammation and without any complication.

**2. Partially healed** – More than 50% improvement in signs and symptoms.

**3. Not healed-** The patients showing improvement less than 50% in the signs and symptoms.

**4.** The patients not coming for treatment as per stipulated period.

**Observations of Clinical Studies**

Total 60 patients having *Chhinna Vrana* (incised wound) were selected according to inclusion criteria and grouped into to two groups (30 each) viz. experimental group, in which wounds were sutured with *Guduchi Pratan* and control group, in which suturing was done with Linen Thread. Observations and results of this study in these two groups are elaborated in following heading.

- Descriptive statistical analysis of patients.
- Analysis of wound- assessment criteria in both groups.
- Statistical analysis of total effect of suturing over wound.
- Comparative analysis to evaluate relative efficiency of treatment given in both groups.

**Table 1: Edema V/s Groups**

|   | Groups                   |                         |                          |                         |
|---|--------------------------|-------------------------|--------------------------|-------------------------|
|   | Experimental Group       |                         | Control group            |                         |
|   | Before treatment (Edema) | After treatment (Edema) | Before treatment (Edema) | After treatment (Edema) |
| <b>No edema</b>                                   | 0<br>0.0%                | 28<br>93.3%             | 0<br>0.0%                | 24<br>80.0%             |
| <b>Mild edema</b>                                 | 21<br>70.0%              | 2<br>6.7%               | 26<br>86.7%              | 6<br>20.0%              |
| <b>Suture line swelling with pain and redness</b> | 8<br>26.7%               | 0<br>0.0%               | 4<br>13.3%               | 0<br>0.0%               |
| <b>Suture line swelling more than 1cm</b>         | 1<br>3.3%                | 0<br>0.0%               | 0<br>0.0%                | 0<br>0.0%               |
| <b>Total</b>                                      | 30<br>100.0%             | 30<br>100.0%            | 30<br>100.0%             | 30<br>100.0%            |



Table 2: Color V/s Groups

|                              | Groups                   |                         |                          |                         |
|------------------------------|--------------------------|-------------------------|--------------------------|-------------------------|
|                              | Experimental Group       |                         | Control group            |                         |
|                              | Before treatment (Color) | After treatment (Color) | Before treatment (Color) | After treatment (Color) |
| Normal pigmentation          | 0                        | 26                      | 0                        | 24                      |
|                              | 0.0%                     | 86.7%                   | 0.0%                     | 80.0%                   |
| Slight red                   | 19                       | 3                       | 27                       | 5                       |
|                              | 63.3%                    | 10.0%                   | 90.0%                    | 16.7%                   |
| Reddish black                | 10                       | 1                       | 3                        | 1                       |
|                              | 33.3%                    | 3.3%                    | 10.0%                    | 3.3%                    |
| Pale yellow/blackish /bluish | 1                        | 0                       | 0                        | 0                       |
|                              | 3.3%                     | 0.0%                    | 0.0%                     | 0.0%                    |
| Total                        | 30                       | 30                      | 30                       | 30                      |
|                              | 100.0%                   | 100.0%                  | 100.0%                   | 100.0%                  |

Table 3: Discharge V/S Groups

|                               | Groups                       |                             |                              |                             |
|-------------------------------|------------------------------|-----------------------------|------------------------------|-----------------------------|
|                               | Experimental Group           |                             | Control group                |                             |
|                               | Before treatment (Discharge) | After treatment (Discharge) | Before treatment (Discharge) | After treatment (Discharge) |
| No discharge                  | 0                            | 27                          | 0                            | 28                          |
|                               | 0.0%                         | 90.0%                       | 0.0%                         | 93.3%                       |
| Occasionally serous discharge | 9                            | 1                           | 13                           | 1                           |
|                               | 30.0%                        | 3.3%                        | 43.3%                        | 3.3%                        |
| Scanty often discharge        | 10                           | 2                           | 15                           | 1                           |
|                               | 33.3%                        | 6.7%                        | 50.0%                        | 3.3%                        |
| Profuse continuous discharge  | 11                           | 0                           | 2                            | 0                           |
|                               | 36.7%                        | 0.0%                        | 6.7%                         | 0.0%                        |
| Total                         | 30                           | 30                          | 30                           | 30                          |
|                               | 100.0%                       | 100.0%                      | 100.0%                       | 100.0%                      |

Table 4: Local Temperature V/s Groups

|   | Groups                               |                                     |                                      |                                     |
|---|--------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|
|   | Experimental Group                   |                                     | Control group                        |                                     |
|   | Before treatment (Local temperature) | After treatment (Local temperature) | Before treatment (Local temperature) | After treatment (Local temperature) |
| Normal  | 0                                    | 26                                  | 0                                    | 24                                  |
|   | 0.0%                                 | 86.7%                               | 0.0%                                 | 80.0%                               |
| Mildly raised than normal                             | 26                                   | 3                                   | 30                                   | 6                                   |
|   | 86.7%                                | 10.0%                               | 100.0%                               | 20.0%                               |
| Raised than Normal with severe tenderness & hyperamia | 4                                    | 1                                   | 0                                    | 0                                   |
|   | 13.3%                                | 3.3%                                | 0.0%                                 | 0.0%                                |
| Total   | 30                                   | 30                                  | 30                                   | 30                                  |
|   | 100.0%                               | 100.0%                              | 100.0%                               | 100.0%                              |

Table 5: Tenderness V/s Groups

|   | Groups                        |                              |                               |                              |
|---|-------------------------------|------------------------------|-------------------------------|------------------------------|
|   | Experimental Group            |                              | Control group                 |                              |
|   | Before treatment (Tenderness) | After treatment (Tenderness) | Before treatment (Tenderness) | After treatment (Tenderness) |
| Tolerance to pressure                       | 0                             | 26                           | 0                             | 22                           |
|   | 0.0%                          | 86.7%                        | 0.0%                          | 73.3%                        |
| Little response to sudden pressure          | 11                            | 2                            | 18                            | 6                            |
|   | 36.7%                         | 6.7%                         | 60.0%                         | 20.0%                        |
| Wincing of face on superficial slight touch | 14                            | 2                            | 12                            | 2                            |
|   | 46.7%                         | 6.7%                         | 40.0%                         | 6.7%                         |
| Resist to touch and rigidity                | 5                             | 0                            | 0                             | 0                            |
|   | 16.7%                         | 0.0%                         | 0.0%                          | 0.0%                         |

|              |        |        |        |        |
|--------------|--------|--------|--------|--------|
| <b>Total</b> | 30     | 30     | 30     | 30     |
|              | 100.0% | 100.0% | 100.0% | 100.0% |

Regarding clinical symptoms, five clinical symptoms were assessed according to score from 0 to 3. These symptoms were Edema, Color, Discharge, Local temperature, Tenderness.

- 1) Edema:** It was observed that 93.3% of patients from experimental group get complete relief after 7days while 80% from control groups got complete relief. Only 6.7% patients from Experimental group showed mild edema after 7days whereas 20% patients from control group showed mild edema.
- 2) Color:** 86.7% patients of Experimental group showed normal pigmentation after 7days. There were 10% wounds from Experimental group and 16.7% from Control group showed slight red color while from both Groups 3.3% wounds showed

pale yellow/ blackish color in wound. The wounds were not healed by primary intension.

- 3) Discharge:** There was significant reduction in Discharge i.e. 90.0% in experimental group and 93.3% in control group. In experimental group there was more evidence of discharge symptom.
- 4) Local temperature:** It was observed that 86.7% patients from experimental group showed relief from local temperature while 80% patients from control group have got relief. This indicates that there is more relief in experimental group.
- 5) Tenderness:** 86.7% patients from experimental group got relief while 73.3% patients from control group got relief from tenderness symptom, which is lesser as compared to experimental group.

**Table 6: Result of suturing of patients in two group v/s Groups**

|                          | Groups             |               | Total  |
|--------------------------|--------------------|---------------|--------|
|                          | Experimental Group | Control group |        |
| <b>Completely healed</b> | 26                 | 26            | 52     |
|                          | 86.7%              | 86.7%         | 86.7%  |
| <b>Not healed</b>        | 1                  | 1             | 2      |
|                          | 3.3%               | 3.3%          | 3.3%   |
| <b>Partially healed</b>  | 3                  | 3             | 6      |
|                          | 10.0%              | 10.0%         | 10.0%  |
| <b>Total</b>             | 30                 | 30            | 60     |
|                          | 100.0%             | 100.0%        | 100.0% |

When the overall effect of suturing by *Guduchi Pratan* and by Linen Thread is considered no any difference observed in completely healed wounds. 10% wounds healed partially and 3% wounds were not healed by primary intension.

**Table 7: Effect of Suturing on Signs Score**

|                          | Experimental Group |                 |            |               | Control Group    |                 |            |               |
|--------------------------|--------------------|-----------------|------------|---------------|------------------|-----------------|------------|---------------|
|                          | Before Treatment   | After Treatment | Difference | Relief In (%) | Before Treatment | After Treatment | Difference | Relief In (%) |
| <b>Edema</b>             | 40                 | 2               | 38         | 95.0%         | 34               | 6               | 28         | 82.4%         |
| <b>Color</b>             | 42                 | 5               | 37         | 88.1%         | 33               | 7               | 26         | 78.8%         |
| <b>Discharge</b>         | 62                 | 5               | 57         | 91.9%         | 49               | 3               | 46         | 93.9%         |
| <b>Local Temperature</b> | 34                 | 5               | 29         | 85.3%         | 30               | 6               | 24         | 80.0%         |
| <b>Tenderness</b>        | 54                 | 6               | 48         | 88.9%         | 42               | 10              | 32         | 76.2%         |

**H<sub>0</sub>:** The relief in Experimental group and Control Groups are not significantly different.

**H<sub>1</sub>:** The relief in Experimental group and Control Groups are significantly different.

When Z - test is applied to this data, it was observed that there is significant difference in the score of Edema and Tenderness of the experimental and control group.

**Table 8: Difference in the score of Edema and Tenderness of the experimental and control group**

|                          | Relief In (%)      |               | Z Test Statistic (Calculated) | Z Test Statistic (Tabulated) at 0.1 level of Significance | Results               |
|--------------------------|--------------------|---------------|-------------------------------|---|-----------------------|
|                          | Experimental Group | Control Group |                               |   |                       |
| <b>Edema</b>             | 95.0%              | 82.4%         | 1.541                         | 1.28  | Reject H <sub>0</sub> |
| <b>Color</b>             | 88.1%              | 78.8%         | 0.969                         | 1.28  | Accept H <sub>0</sub> |
| <b>Discharge</b>         | 91.9%              | 93.9%         | 0.302                         | 1.28  | Accept H <sub>0</sub> |
| <b>Local Temperature</b> | 85.3%              | 80.0%         | 0.542                         | 1.28  | Accept H <sub>0</sub> |
| <b>Tenderness</b>        | 88.9%              | 76.2%         | 1.296                         | 1.28  | Reject H <sub>0</sub> |

From the above table it is clear that, There is evidence that Relief in (%) of Experimental and Control groups has significantly different in Edema and Tenderness with 0.1 level of significance

## DISCUSSION

To study efficiency of on *Guduchi Pratan* as suture material thorough study of different types of suture materials, their benefits, disadvantages and their manufacturing process was studied. Detail study of *Guduchi* was done.

The study was mainly divided into two phases-

1. Study of physical characters of *Guduchi Pratan*.
2. Clinical study in patients with *Chhinna Vrana* to access efficiency of *Guduchi Pratan* in suturing.

As it is not clearly mentioned about what kind of *Guduchi Pratan* should be taken like wet or dry, both the forms were tried and attempt was performed to provide good preservative material for *Guduchi Pratan*. For this purpose *Guduchi Pratan* was preserved in three different materials- 1. Oil, 2. Glycerin 3. Lysol and physical characteristics of each sample were tested. The results indicated that *Guduchi Pratan* has got variable diameter. Its value varies between 0.372mm to 0.563mm and its Knot Pull Tensile strength varies between 0.163kgf to 0.9375kgf. Out of these three samples, it was observed that the sample stored in Lysol had got maximum Knot Pull Tensile Strength though it is not similar to USP standards.

So *Guduchi Pratan* stored in Lysol was taken for Clinical Studies. Total 60 patients with *Chhinna Vrana* were taken for study and divided into two groups, viz. Group A- Experimental Group and Group B- Control Group, 30 patients were in each group. In Experimental group wounds were sutured with *Guduchi Pratan* and in Control Group wounds were sutured with Linen Thread. Then the wounds were assessed according to assessment criteria - a. Edema b. Color c. Temperature d. Tenderness and e. Discharge. Assessment was done on 3<sup>rd</sup>, 5<sup>th</sup>, 7<sup>th</sup> day and on 7<sup>th</sup> day, sutures were removed. Observations were noted and statistical analysis was done which revealed that there is no any considerable difference between experimental and control group regarding healing process. In both groups wounds of 3% patients were not healed, wounds of 10% patients were partially healed, while those of 86% patients in both groups, was healed completely. But regarding edema and tenderness it was observed that there was significant difference in process of reduction of edema and tenderness in Experimental Group.

When the overall effect of suturing by *Guduchi Pratan* and by cotton thread is considered no any difference observed in completely healed wounds. 10% wounds healed partially and 3% wounds were not healed by primary intension.

When Z - test is applied to this data, it was observed that there is significant difference in the score

of Edema and Tenderness of the experimental and control group.

As described in literary review it is clear that Alcohol extract and Ether extract of *Guduchi* shows antibacterial as well as anti-inflammatory activity probably this being the reason behind these results i.e. showing less occurrence of edema and tenderness. The second reason that may be responsible is *Tikata rasa* of *Guduchi*. It is known that *Tikta* and *Kashaya rasa* help in wound healing. So *Tikata rasa* of *Guduchi* may be the responsible factor for producing these effects.

Along with these effects when question arises about the scar formed or stitch impressions, it was observed that *Guduchi Pratan* doesn't produce the long lasting stitch impression, and the scar formed is also minimal. No major difference was found in these factors when compared with wounds sutured with other suture material.

## CONCLUSION

While evaluating this clinical study, the following conclusions can be drawn from the observations obtained during the study.

- 1) The ancient advice by *Sushruta* for use of *Guduchi Pratan* i.e. Tendrils of *Tinospora Cordifolia* as a Herbal suture material as described in *Ayurveda* is established in this study.
- 2) The study showed that suturing with *Guduchi Pratan* produces less edema, less tenderness and less discoloration at suture site which may be due to anti-inflammatory and anti-bacterial activity of *Guduchi Pratan*.
- 3) It may be considered that along with giving support to wound edges for remaining approximated, *Guduchi Pratan* also adds some medicinal properties.
- 4) *Guduchi* is widely available plant and it can be cultivated any where easily so availability of *Guduchi Pratan* is also easy in any part of India.
- 5) As it is widely available it can help to bring down the treatment cost in case of *Chhinna Vrana*
- 6) Therefore considering the cost and availability of *Guduchi Pratan* Preparation and use of *Guduchi Pratan* as Herbal Suture material may prove excellent suturing material for rural areas
- 7) Considering its tensile strength, though lower from USP standards, it has got sufficient tensile strength for wound margins to hold approximated up to the period required for wound healing.
- 8) *Guduchi Pratan* is available in different diameters, therefore wide range of size can be derived for suturing of different sites.
- 9) The knot taken by *Guduchi Pratan* is well secured and requires only 2-3 knots The knot doesn't get slipped for 7-10 days.

10) There is no significant difference in the percentage wise healing of wound as compared to other suture materials.

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Figure 1: Place of Collection of tendrils of *Tinospora Cordifolia*:

Knot pool and tensile strength testing:



Figure 2: Motor driven tensile strength-testing machine-



Figure 3: Diameter Testing:



Tila Tail

Glycerine

Lysol

