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Research Article

A PRE-POST STUDY TO EVALUATE THE EFFECT OF *AGNIKARMA* WITH *GUDA* IN ACHILLES TENDINITIS

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ABSTRACT

Achilles tendinitis is a condition that is caused by an over use injury of the achilles tendon, and presents with a symptoms like pain, tenderness and weakness of the 4 achilles tendon. In modern medicine the management includes NSAIDs, analgesics, corticosteroid injection and surgical decompression, but these have many complications and the recurrence rate is high in nature. In ayurveda it comes under *Snayugata vatavyadhi* with treatment modalities such as *Snehana, Agnikarma* and *Upanaha*. Based on the structure involved, Susrutha acharya prescribed different type of *Dravyas* for *Agnikarma. Guda* is indicated in *Snayu Vikaras* as a *Dahanopakarana*. **Aim:** To evaluate the effect of *Agnikarma* with *Guda* in achilles tendinitis. **Materials & methods:** This is a pre and post clinical trial with 26 participants in a single group selected on the basis of inclusion and exclusion criteria. *Tapta Guda* (in Bindu form) was dropped on the most tender points of achilles tendon, which was marked before the procedure. Assessment was taken on 1st day- before and after the procedure, 7th, 14th and 21st day of the procedure. Change in pain and tenderness were taken as outcome variables and were assessed through required scales and the results was analysed using appropriate statistical techniques.

INTRODUCTION

Achilles tendinitis is a condition caused by repetitive intense strain of the achilles tendon, the band of tissue that connects calf muscles at the back of the lower leg to heel bone[1]. The symptoms include, pain and tenderness along the achilles tendon which is severe in morning, swelling and warmth along the tendon, pain increases when walking/running, difficulty in standing upon one toe, limited range of motion during dorsiflexion and plantar flexion.[3] Reported incidence of this disease is 1.85 /1000 registered patients and of 2.35 in the adult population. Prevalence fluctuates among different ages and chances are more in middle aged men, with a men to women ratio 6: 1[4]

Allopathic management for the same is mainly conservative, which include rest, NSAIDs, cortico steroid injections etc, and last option is surgery, but all these have side effects and has limitations like risk of recurrence, post operative immobility period and scar formation along with chance of infection.[5]

On the basis of structure involved in the pathology and its signs and symptoms, achilles tendinitis can be correlated with the condition of *Snayugatha vata* in Ayurveda.[6] Treatment of *Snayugatha vata vyadhi* includes *Snehana, Upanaha* and *Agnikarma.*[7] *Agnikarma* is an *Anusastra* which is superior *to Bheshaja, Sastra,* and *Kshara*.[8] Based on the structure involved, Susrutha acharya prescribed different *Dravyas* for *Agnikarma*. *Guda* is indicated in *Snayu vikaras*, as a *Dahanopakarana*.[9]

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AIM AND OBJECTIVE

AIM

To evaluate the effect of *Agnikarma* with *Guda* in the management of achilles tendinitis.

OBJECTIVE

To evaluate the effect of *Agnikarma* with *Guda* at the tender points over achilles tendon in reducing signs and symptoms of achilles tendinitis.

MATERIALS AND METHODS

Study Design

Single group pre – post interventional study.

Study Setting

OPD and IPD of Salyatantra Department Govt. Ayurveda college hospital Trivandrum. The study was conducted for a period of 1.5 years.

Study Population

Patients between age group of 20 -60 yrs irrespective of gender having the clinical features of achilles tendinitis (pain, tenderness,) with positive RLH test and ARC test on the basis of inclusion and exclusion criteria selected from the OPD and IPD of Salyatantra department, Government Ayurveda College Hospital Thiruvananthapuram.

Inclusion Criteria

- Age - 20 -60 years
- Gender - irrespective of gender.
- Patients having signs and symptoms of achilles tendinitis such as pain, tenderness, and positive RLH test & ARC test

Exclusion Criteria

- Calcaneal spur
- Plantar fasciitis
- Dislocation and fracture of ankle joint.
- Diagnosed systemic disorders– uncontrolled diabetes mellitus, rheumatoid arthritis.
- Patients who are contraindicated for *Agnikarma* as mentioned in classics

Sample Size -26

Intervention

Selected patients were treated with *Bindu* type of *Agnikarma* with *Guda* in a single sitting. Pre operative procedure:

- Patients of both sexes between the age group 20-60 satisfying inclusion criteria was selected for the study.
- Detailed clinical examination, laboratory investigations and radiological tests was done and data was recorded.
- Patients were informed in detail about the treatment procedure and informed consent was obtained.
- Inj TT is given prior to the procedure materials required:
- Betadine solution, sterile cotton, surgical gloves, kidney tray, sterile bowl, honey, *Guda*, gas stove, borosil dropper, *Ghritha*, probe thermometer, Tt injection, swab holding forceps, sterile water, artery forceps, surgical drape.
- Minor OT was equipped with materials required for the procedure.
- The participants were allowed to lie in prone position comfortably.
- The preferred part was cleaned and made aseptic using betadine solution.
- The most tender sites along the course of achilles tendon is marked.

Operative procedure

Required amount of *Guda* and water is taken in equal quantity in a sterile dish and heated over the stove till it attained syrup consistency (130°C-140°C), and its temperature was measured with a probe thermometer. One drop of *Guda* was taken and dropped in each marked site by a borosil dropper. Approximately 5cm gaping was maintained between each drop and wiped off carefully after cooling using sterile cotton.

Post operative procedure

- Mixture of *Madhu* and *Gritha* was applied after *Agnikarma*.
- Participants were observed for 30 min for any blister formation or increase of pain. After 30 min they were advised to leave the operation theatre.
- Participants were advised to continue the application of *Madhu* and *Gritha* till the wound healed.
- Periodical observation was done on 1st, 7th, 14th and 21st day after *Agnikarma*.

The result was analyzed statistically.

- Study Period – 21 days

Outcome Measurements

1. Primary objective- Pain
2. Secondary objective- Tenderness

Royal London Hospital Test ARC test

Assessment Criteria

Pain

The pain reading was graded using visual analogue scale.

- Nil
- 1-3 – Mild
- 4-6 – Moderate
- 7 and above – Severe

Tenderness

- Grade 0 – No tenderness.
- Grade 1 - The patient says the part is tender.
- Grade 2 - The patient winces due to pain.
- Grade 3 - The patient winces and withdraws the affected part.
- Grade 4 - The patient does not allow the part to touch.

Royal london hospital test: Positive Negative

Arc test: Positive Negative

Data Analysis

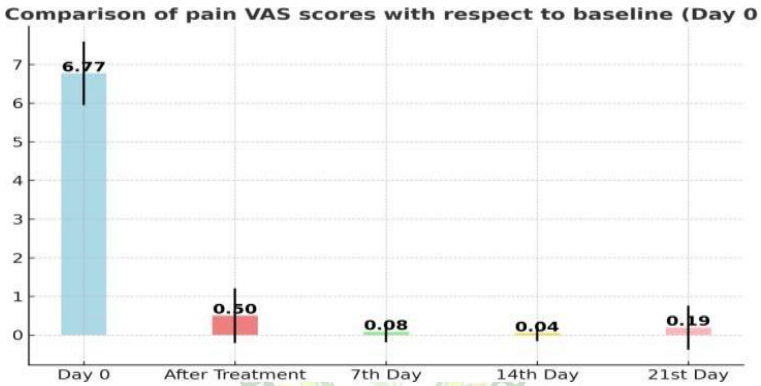
The data related to various assessments of both subjective and objective parameters, before and at the end of treatment of 26 participants were taken for statistical analysis. The result of treatment was analysed through Wilcoxon signed rank test.

OBSERVATIONS AND RESULT

Data Related Change in Pain

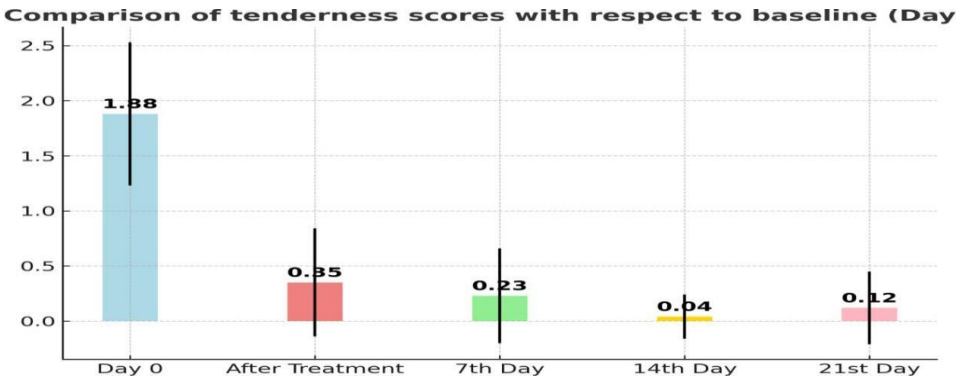
- Comparison of pain VAS scores with respect to baseline (Day 0)
- The Wilcoxon Signed Rnak test results show highly significant reductions in pain scores, with z scores above 4.5 and p value less than. 001 for comparisons of before treatment with after treatment, as well as with the 7th 14th, and 21st days, indicating consistent and statistically significant pain reduction over the follow up period.

Groups	Mean	SD	Median	IQR	Z value	p value
Day 0	6.77	0.82	7.0	6-7	Ref	-
After treatment	0.50	0.71	0.0	0-1	-4.556	<0.001
7th Day	0.08	0.27	0.0	0-0	-4.548	<0.001
14th Day	0.04	0.20	0.0	0-0	-4.534	<0.001
21st Day	0.19	0.57	0.0	0-0	-4.512	<0.001



Data Related to Change in Tenderness

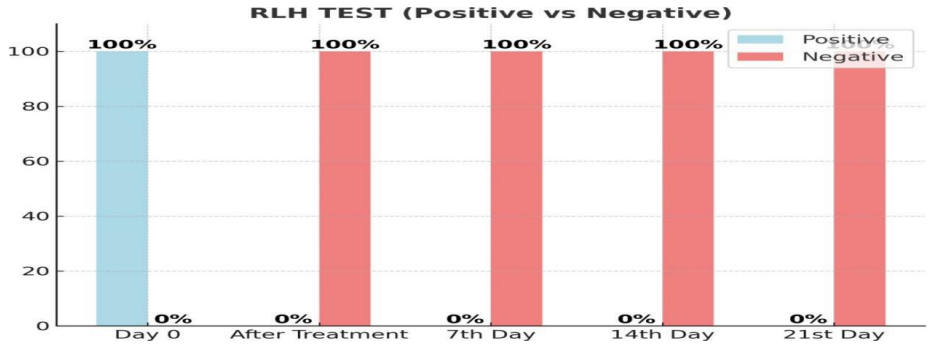
Comparison of tenderness scores with respect to baseline (Day 0) results show highly significant reductions in tenderness scores, with z scores above 4.5 and p value less than 01 for comparisons of before treatment with after treatment, as well as with the 7th 14th, and 21st days, indicating consistent and statistically significant tenderness reduction over the follow up period.



Groups	Mean	SD	Median	IQR	Z value	p value
Day 0	1.88	0.65	2.0	1-2	Ref	-
After treatment	0.35	0.49	0.0	0-1	-4.597	<0.001
7th Day	0.23	0.43	0.0	0-0	-4.636	<0.001
14th Day	0.04	0.20	0.0	0-0	-4.597	<0.001
21st Day	0.12	0.33	0.0	0-0	-4.565	<0.001

Data Related to Change RLH Test

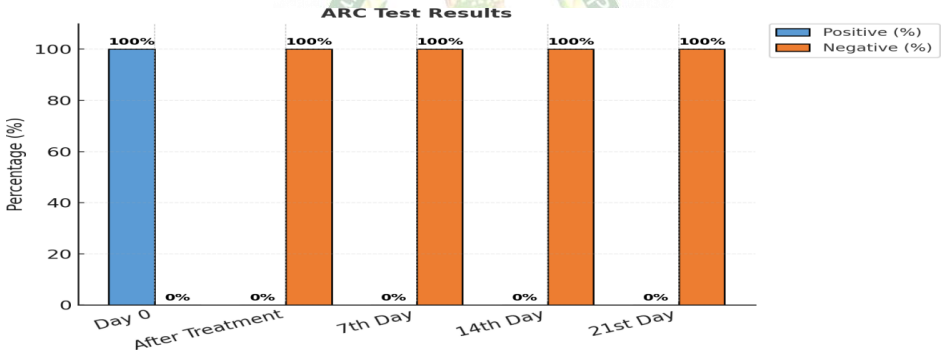
All participants were positive at baseline and negative at every follow-up time point, with highly significant changes ($p < 0.001$) at each post-treatment assessment.



NRS	Positive n (%)	Negative n (%)	p value
Day 0	26 (100%)	0 (0%)	Ref
After treatment	0 (0%)	26 (100%)	<0.001
7th Day	0 (0%)	26 (100%)	<0.001
14th Day	0 (0%)	26 (100%)	<0.001
21st Day	0 (0%)	26 (100%)	<0.001

Data Related to Change in ARC Test

McNemar's test indicated a statistically significant change from positive to negative results at each follow-up compared to baseline ($p < 0.001$).



NRS	Positive n (%)	Negative n (%)	p value
Day 0	26 (100%)	0 (0%)	Ref
After treatment	0 (0%)	26 (100%)	<0.001
7th Day	0 (0%)	26 (100%)	<0.001
14th Day	0 (0%)	26 (100%)	<0.001
21st Day	0 (0%)	26 (100%)	<0.001

DISCUSSION

Discussion on Methodology

Agnikarma with *Guda* was done as a one-time procedure. On the next day of *Agnikarma* in all the 26 participants blisters were formed. The mixture of *Madhu* and *Gritha* was applied over the site. In 15 participants it healed within 1st week and among the remaining 10 participants 7 were healed within 2nd week and remaining 3 participants it took more than 2 week. So, *Madhu ghrita* mixture was applied till the wound healed. The *Madhu* has antimicrobial, anti–inflammatory and moisturizing properties which prevents infections and heals the wound fast[7]. *Ghrita* having *Pittahara* property helps in reducing the burning sensation due to *Agnikarma* and healing the wound.[8]

Discussion on Outcome Variables

Pain

In this study, before treatment,16 participants had severe pain with a 7-8 score and 10 participants had moderate pain with a score 4-6. Immediately after treatment, none of the participants had severe pain, 9 participants had mild pain. This means that *Agnikarma* with *Guda* has an instant effect on pain.

It is observed that during the follow up period pain became zero to mild in participants who were doing strenuous work like manual labour. This indicates that the pain relief is consistent in the follow up days, and gradually the effectiveness of treatment may go over time for those involved in strenuous activities

Tenderness

Initially, before treatment 4 participants had grade 3 tenderness,15 had grade 2 tenderness,7 had grade 1 tenderness. Immediately after the treatment, there was a considerable improvement that 17 participants had no tenderness and 9 had grade 1 tenderness. This suggests that the treatment was highly effective in reducing the tenderness.

Response to RLH Test

Before the treatment all the participants had positive RLH test, and immediately after the study test became negative for all participants which sustained during follow up period. On 21st day the result was same above. Thus, showing the effect of the treatment.

Response to ARC Test

Before the treatment all the participants had positive arc test, and immediately after the study test became negative for all participants which sustained during follow up period. On 21st day the result was same above. Thus, showing the effect of the treatment.

Probable Action of *Agnikarma*

Effect on Metabolism[9]

According to Vant Hoff's principle the basal metabolism of the body increases by certain percentage for every 1°C rise in body temperature. That is the place where heat burns occur, the local tissue metabolism gets improved. Thus, various metabolic and rejuvenating changes take place at the site of heat burns, thus it leads to increased demand of oxygen and nutrients at the site of heat burn It also excretes the unwanted metabolites and toxins.

Effect on the Blood Circulation

While doing *Agnikarma*, the superficial sensory nerves get stimulated which leads to dilatation of local blood vessels, resulting in increased blood circulation. Apart from this it also decreases the viscosity of blood and helps in the removal of accumulated waste products.

Effect on Pain

- According to Ayurveda the main reason for pain is the aggravation of *Vata dosha*. It has been mentioned that there is no pain without *Vata*, i.e. *Atmarups* of *Vata* itself is *Sula*. Movement is the unique feature of *Vata*. When the movement of *Vata* is obstructed, it leads to an aggravation of *Vata Dosha*, known as *Vata prakopa*.
- The movement of *Vata* can be obstructed due to *Srotho avarodha* i.e.; obstruction of the channels by toxins known as ama. The *Ushna, Teeshna*, *Sukshma, Asukari guna* of *Agni* removes *Srothorodha* there by pacify the vitiated *Vata* and *Kapha*, ultimately reducing pain. And also *Ushna guna* of *Agni* acts against the seta *Guna* of *Vata*, thus alleviate the vitiated *Vata dosha* and results in pain relief.[10]
- While doing *Agnikarma*, it enhances the metabolism of the body tissues *(Dhatwagni),* leads to the digestion of toxins i.e., *Ama pachana* and removes the *Srotho avarodha*, leading to the improved circulation of rasa and *Raktha dhatu* known as *Rasa raktha samvahana* and results in expelling toxins and alleviating pain.[10]
- It increases the blood circulation to the affected site. When the blood circulation increases, the oxygen supply increases and it accelerates tissue healing and removes the inflammatory irritants thus helping in relieving pain.
- The other concept is the Gate control theory, according to this a nonpainful stimulus can obstruct the transmission of painful stimuli to the brain.[11]

Guda as *Dahanopakarana*

Analysis of Thermal Behavior of *Tapta Guda*

The thermal behavior of the *Tapta Guda* was studied by direct methods employed in temperature measurement. The boiling point of *Guda* was determined as 140°C. Above boiling point the sample gets charred, and cooled it will become caramelized.

Specific Heat Capacity of *Guda*

The specific heat for *Tapta Guda* is calculated with the formula $Q = mc\Delta T$, and is found to be 1.74 J/kg·K High specific heat indicates the heat absorbance level of a substance, if the specific heat is high the substance can absorb lot of heat before its temperature rises. *Guda* due to its higher specific heat can effects a greater variation of temperature of the tissue surface in contact with hot jaggery and also that of subsequent layers like tendons and ligaments. Achilles tendon is the strongest tendon in the body.so *Agnikarma* with *Guda* at achilles tendon gives a good result due to its high specific heat.

Heat dissipation time will be less for sticky liquids as the heat retention capacity of sticky liquids is high. And thus, heat penetration to deeper layers will be possible when *Guda* is used for *Agnikarma*.

CONCLUSION

Based on signs and symptoms achilles tendinitis is similar to *Snayu gata vata vikara* in Ayurveda. *Agnikarma* is a simple, cost-effective procedure that can be done in OPD itself. *Agnikarma* is effective in instant pain management. In this study *Agnikarma* with *Guda* helps to reduce the pain immediately after the treatment. The *Dahnopakarana* here used i.e., Guda also plays a major role due to its high specific heat capacity, it helps the heat to penetrate deeper structures. So, from the observations and results we can conclude that *Agnikarma* with *Guda* is effective in the management of achilles tendinitis.

Limitations

- Sample size was not adequate to draw generalized conclusion.
- The study duration was short.
- Chance of oozing down of *Guda* to the surrounding skin during application
- Violation of *Pathyapathya* by the patients may cause for recurrence.
- Need a person for assisting during the procedure in some instances.
- *Agnikarma* should be done with great care in patients who are very sensitive.

Suggestions for Future Research

- It is required to standardize the *Agnikarma* procedure.
- It should be extending the follow up period to observe any notable change in the outcome in a long duration.
- Do a study with a large sample size.

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