International Journal of Applied Ayurved Research ISSN: 2347- 6362

A COMPARATIVE STUDY OF *AGNIKARMA* WITH *TAPTA KSHAUDRA* AND *PANCHADHATU SHALAKA* IN CARPAL TUNNEL SYNDROME

[1*]Prasanth K S, Ravishankar A G[2]

[1]PG Scholar,Dept. of Salya tantra, Alva's Ayurveda Medical College, Moodbidri, Karnataka.

[2]Professor, Dept. of Shalyatantra, Alva's Ayurveda Medical College, Moodbidri, Karnataka.

ABSTRACT

Carpal tunnel syndrome is a compressive neuropathy due to chronic inflammation of the flexor retinaculum which will cause compression to the median nerve and associated structures. The condition comprises of pain, paresthesia, numbness and restricted movements to the wrist joint and to the lateral three and half fingers of the hand. It can be denoted as *Manibandha Sandhi Sthita Snayugata Vata* in ayurveda. According to Ayurvedic classics, the treatment modality *Agnikarma*, is having an important role in the management of *Snayugata Vata Vikaras*. *Dahanopakarana* such as *Kshaudra*, *Guda*, *Sneha* etc. have been specifically mentioned for *Agnikarma* in the diseases of *Sira*, *Snayu*, *Sandhi* and *Asthi*. *Panchadhatu Shalaka* is employed on a regular basis for doing *Agnikarma* in *Manibandha Sandhi Sthita Snayugata Vata*, the Carpal Tunnel Syndrome. Clinical trials were conducted in 40 patients, assigned in two groups of 20 each. The patients were treated with *Agnikarma* using *Panchadhatu Shalaka* and *Agnikarma* using *Tapta Kshaudra* in Group A and Group B respectively. On comparison the *Tapta Kshaudra* is statistically more significant in reducing pain, numbness and restricted movements than that of *Agnikarma* done using *Panchadhatu Shalaka*.

Keywords: *Agnikarma, Manibandha Sandhi Sthita Snayugata Vata,* Carpal Tunnel Syndrome, Compressive Neuropathy,*Tapta Kshaudra, Panchadhatu Shalaka.*

INTRODUCTION: The pain or discomfort is the distressing factor of mankind and wants to get rid of that with effortless techniques at the earliest. The studies show that, Carpal tunnel syndrome having a fast growing annual incidence rate of 5 to 50 per ten thousand of the population[1]. The condition is more prone to computer professionals, keyboard users like musicians, poultry and meat processing workers, house wives etc. needed repetitive flexion and extension of the wrist joint. In conventional system the treatment modalities include surgery, corticosteroid injection (done just medial to the Palmaris longus tendon using blunt tip 25 gauge needle. Direct the needle toward the third digit at a 30 degree angle and advance the needle approximately 1.5 to 2 cm), NSAIDs, splinting the wrist and physiotherapy[2]. But these treatments have their own limitations such as drug reactions, complexity of the procedure, expense etc. The insightful authority of *Agnikarma* becomes clear from the wide descriptions in various Ayurvedic texts belonging to the *Vedic*, *Samhita* and *Samgraha* period. *Agnikarma* is mainly indicated in painful conditions and diseases of *Vata* as well as *Kapha*[3]. *Panchadhatu Shalaka* has been used on a regular basis for the purpose of *Agnikarma* irrespective of the structure involved or level of the pathology. As in Carpal tunnel syndrome, involved structures are tendons, ligaments and nerves[4], *Tapta Kshaudra*

(Heated Honey) had been taken for *Agnikarma* and its efficacy was compared with *Panchadhatu Shalaka.*

OBJECTIVES

1. Evaluate the efficacy of *Agnikarma* with *Tapta Kshaudra* in Carpal Tunnel Syndrome with the assessment criteria using student t-test.
2. Evaluate the efficacy of *Agnikarma* with *Panchadhatu Shalaka* in Carpal Tunnel Syndrome with the assessment criteria using student t-test.
3. Evaluate the boiling point/red hot temperature of *Kshaudra* and *Panchadhatu Shalaka (*with pyrometer and iron constantan thermocouple) and their specific heat rate.
4. Compare the efficacy of *Agnikarma* with *Panchadhatu Shalaka* and *Tapta Kshaudra* in Carpal Tunnel Syndrome with paired t-test.

MATERIALS

Physical Analysis of *Panchadhatu Shalaka*: Physical analysis of *Panchadhatu Shalaka* was carried out with the aim to ascertain the component metals in it and also to determine the thermal behavior of the particular alloy.

The quantity of component metals was detected and estimated by the X-Ray Fluorescent (XRF) spectrometry. The data obtained was,

- *Tamra*(Copper) 42.56%
- *Loha*(Iron) 33.48%
- *Yashada*(Zinc) 09.24%
- *Vanga*(Tin) 08.35%
- *Rajata*(Silver) 06.37%

The temperature of the *Shalaka* when red hot was also measured using a Pyrometer and also confirmed using an Iron Constantan thermocouple. When red hot the temperature was determined as 260^{o}C. During the first minute the temperature was found to decrease to approximately 234^{o}C. The temperature decreased by an approximate rate of 8^{o}C to 9^{o}C per minute, as observed during the next 5 to 6 minutes under normal atmospheric conditions. Afterwards there is a very fast dissipation of heat of about 13^{o}C to 14^{o}C.

Physical Analysis of *Kshaudra* : *Kshaudra* was experimented for its boiling point. A direct method was selected for the purpose, which involved temperature measurement using a pyrometer. The boiling point of the sample was determined to be 130^{o}C to 140^{o}C. On removing the heat source a gradual dissipation of temperature was noted at a rate of 3^{o}C to 4^{o}C per minute for a period of 3 to 4 minutes under normal atmospheric conditions. After this short initial duration there was a gradual and almost constant dissipation of heat about 6^{o}C to 8^{o}C.

SPECIFIC HEAT: The specific heat for *Tapta Kshaudra* is in the 0.54-0.60 cal/g/^{o}C range for liquid and is equal to 0.73cal/g/^{o}C for finely granulated. Also the thermal conductivity of honey increases with temperature as 118 x10^{-5} to 143 x 10^{-5}cal/cm sec°C. The specific heat of *Kshaudra* is more than that of solid form *Panchadhatu Shalaka.*

By the estimation 23 cal of heat was required to raise the temperature of 1gm of honey to 4^{o}C. So the specific heat of the *Kshaudra* was estimated by the equation as 0.575cal/g/^{o}C, which is in the range of normal calculated specific heat of the *Kshaudra.*

Criteria for Selection of Patient: The clinical trial was performed in patients selected from the Outpatient department of Alva's Ayurveda Medical College Hospital, Moodbidri and other clinical

sources. The selection was done by simple random sampling, between the age group of 20 to 60 years, irrespective of sex, religion, marital status and socio-economic status.

Diagnostic Criteria: Diagnosis of the disease was carried out on the basis of a special case proforma prepared after considering the Ayurvedic and modern medical literature. A detailed proforma including the following signs and symptoms was prepared.

Table No. 1

Subjective	**Objective**
• Pain over wrist joint. • Numbness over the thumb, index, middle and lateral half of ring fingers of hand. • Paresthesia over the wrist, thumb, index, middle and lateral half of ring fingers of hand. • Restricted movements of wrist.	• Pain during passive flexion and extension of wrist joint. • Tinel's test: It is performed by tapping the median nerve along its course in wrist. This causes tingling in the fingers if it is positive. • Phalen's test: It is done by pushing the back of hands together for 1 minute. Positive test gives same symptoms which one experiences with Carpal Tunnel Syndrome.
Inclusion criteria	**Exclusion criteria**
• Clinically diagnosed patients of Carpal Tunnel Syndrome. • Any individual above 20 years and below 60 years of age will be selected irrespective of sex, occupation, religion and socioeconomic status.	• Patients with the history of systemic diseases such as Diabetes, Tuberculosis, Rheumatoid arthritis, Gouty arthritis etc. • Malignant tumors, senile osteoporosis etc in and around the wrist joint. • Patients with history of Colles' fracture, Smith's fracture, Compound fracture, Pathological fracture, Non-united fracture and Mal-united fracture of wrist joint. • Vascular insufficiency to forearm and hand. • Patients with brachial plexus lesion. • Pregnant women.

Laboratory Investigations:

- Plain X-ray of wrist joint done to exclude the other pathology.
- Hb%, TC, DC, ESR, RBS.
- Nerve conduction velocity tests had been done.

Procedure (Intervention): The site of *Agnikarma* was performed along the course of median nerve and space between Kaplan's cardinal line and horizontal skin creases at distal most part of the wrist at the carpal tunnel. About 5mm gap was maintained between each burning spot. *Bindu* type of *Agnikarma* was performed. *Tapta Panchadhatu Shalaka* was used in group A. *Shalaka* was withdrawn abruptly after inflicting each burn. *Tapta Kshaudra* was used in Group B. The *Tapta Kshaudra* was sucked using a Borosil glass pipette, poured on the pre-determined site and wiped off after cooling. In both Group A and Group B a mixture of *Madhu* and *Ghrita* was applied immediately after

Agnikarma. The blebs or ulcers developed at the site of *Agnikarma* were treated by the continued application of the mixture till healing.

Study period:

- Total study period was of 30 days.
- Procedure was conducted as three sittings with a gap of 7 days between each sitting.
- Periodical observations were done on 1st, 8th and 15th day after *Agnikarma*.

Follow up period: After completion of treatment the patients were examined after 15 days to observe the status of condition.

Assessment criteria: Assessment was done on subjective and objective criteria before and after treatment.

Table No. 2

Subjective criteria:	Objective criteria:
• Pain • Numbness • Paresthesia • Restricted movement • Flexion • Extension	• Tenderness • Phalen's Test[5] • Tinel's Test[6]

A detailed proforma was prepared and assessment was done based on gradations given for the subjective and objective parameters and analysed statistically.

RESULTS: The data was collected from patient before the treatment, after procedure on 1st day, 8th day and 15th day.

The assessment parameters include a mixture of qualitative and quantitative data. Student't' Test was done to evaluate the effectiveness of treatment in Group A and B. Paired t-test was performed to compare the effectiveness of Group A and B.

Table No. 3 Effect of Treatment in Signs and Symptoms on 15th Day in Group A

Signs and Symptoms	Mean		%	SD ± SE	"t" Value	"p" Value
	BT	AT				
Pain	2.5	1.05	58	0.224 ± 0.050	12.704	<0.01
Numbness	1	0.7	30	0.470 ± 0.105	2.854	<0.01
Tenderness	2.5	1.2	52	0.410± 0.092	12.365	<0.01
Paresthesia	0.8	0.3	62	0.470 ± 0.105	4.359	<0.01
Restricted Flexion	1.1	0.5	54	0.513 ± 0.113	5.339	<0.01
RestrictedExtension	0.9	0.5	50	0.513 ± 0.113	3.559	<0.01
Phalen's Test	1	0.4	60	0.503 ± 0.112	5.339	<0.01
Tinel'sSign	1	0.3	70	0.470 ± 0.105	6.658	<0.01

Table No: 4 Effect of Treatment in Signs and Symptoms on 15th Day in Group B

Signs and Symptoms	Mean		%	SD ± SE	"t" Value	"p" Value
	BT	AT				
Pain	2.45	0.65	73	0.489 ± 0.109	15.983	<0.01
Numbness	1	0.35	65	0.489 ± 0.109	5.940	<0.01
Tenderness	2.55	1.2	53	0.410 ± 0.092	12.337	<0.01

Paresthesia	0.9	0.3	67	0.470 ± 0.105	5.339	<0.01
RestrictedFlexion	1.4	0.3	78	0.470 ± 0.105	5.772	<0.01
RestrictedExtension	1.2	0.3	75	0.470 ± 0.105	4.723	<0.01
Phalen's Test	1	0.35	65	0.489 ± 0.109	5.940	<0.01
Tinel'sSign	1	0.25	75	0.444 ± 0.0993	7.550	<0.01

Effects of Both Treatments in Signs and Symptoms on 15th Day : There is a statistically significant difference between Group A and Group B in Pain, Numbness and Restricted Movements (Flexion and Extension).

Table No. 5 Comparative Effects of Both Treatments in Signs and Symptoms on 15th Day

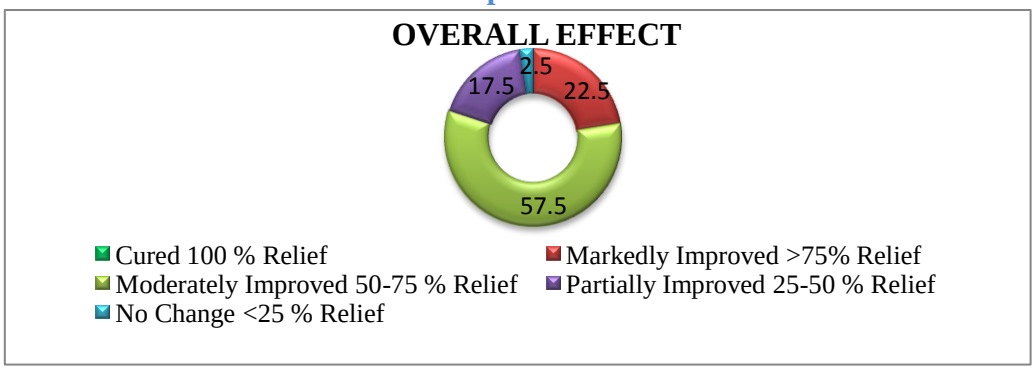
Signs and Symptoms	Mean Difference		Percentage Relief %		"t" Value	"p" Value
	Group A	Group B	Group A	Group B		
Pain	1.45	1.8	58	73	2.142	<0.05
Numbness	0.30	0.65	30	65	2.307	<0.05
Tenderness	1.30	1.35	52	53	0.330	>0.05
Paresthesia	0.50	0.60	62	67	0.623	>0.05
Restricted Flexion	0.60	1.10	54	78	2.260	<0.05
Restricted Extension	0.40	0.90	50	75	2.260	<0.05
Phalen's Test	0.60	0.65	60	65	0.319	>0.05
Tinel's Sign	0.70	0.75	70	75	0.346	>0.05

Overall Effect of the Treatment: In the present study, out of 40 patients, 22.5% got marked improvement, 57.5% got moderate improvement and 17.5% got partial improvement and 2.5% got less than 25% relief.

Table No. 6 Overall Effect of the Treatment

Effect of Therapy	Group A	Group B	Total	%
Cured 100 % Relief	00	00	00	00.0
Markedly Improved >75% Relief	00	09	09	22.5
Moderately Improved 50-75 % Relief	15	08	23	57.5
Partially Improved 25-50 % Relief	04	03	07	17.5
No Change <25 % Relief	01	00	01	02.5

Graph No. 1



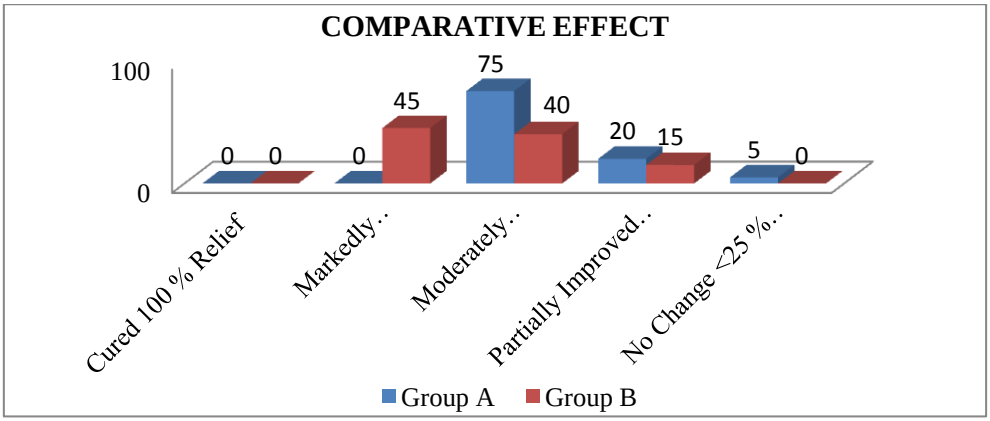
Comparative Effect of the Treatment: In Group B 09 patients, 45% got more than 75 % of relief i.e. markedly improved. In Group A, 15 patients 75% got between 50-

75% of relief while in Group B, 08 patients 40% got between 50-75% of relief i.e. moderately improved. In Group A, 04 patients 20% got between 25-50% of relief while in Group B, 03 patients 15% got between 25-50% of relief i.e. partially improved and in Group A one patient had less than 25% relief.

Table No. 7 Comparative Effect of the Treatment

Effect of Therapy	Group A	%	Group B	%
Cured 100 % Relief	00	00.0	00	00.0
Markedly Improved >75% Relief	00	00.0	09	45.0
Moderately Improved 50-75 % Relief	15	75.0	08	40.0
Partially Improved 25-50 % Relief	04	20.0	03	15.0
No Change <25 % Relief	01	05.0	00	00.0

Graph No. 2



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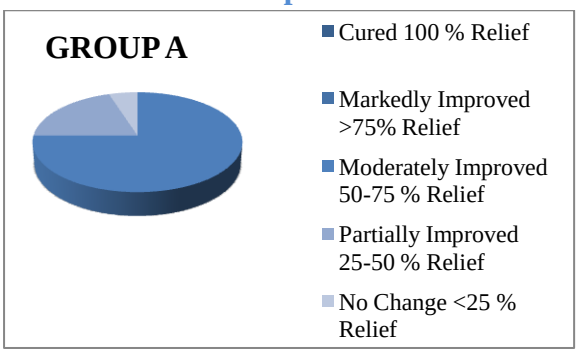

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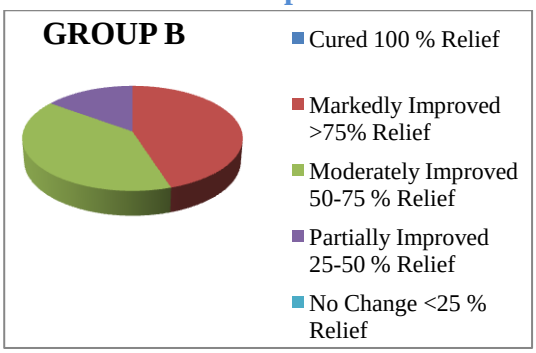

DISCUSSION: The Carpal Tunnel Syndrome (*Manibandha Sandhi Sthita SnayugataVata)* is produced by vitiated *Vata Dosha* with or without *Anubandha* of *Kapha*. So *Agnikarma* is considered as the most preferred therapy to pacify these *Dosha*, by virtue of the properties that *Agni* possesses viz. *Ushna, Tikshna, Sukshma, Ashukari Guna.* These *Guna* are opposite to the properties of *Vata* and *Kapha*. In the present study *Tapta Kshaudra* and *Panchadhatu Shalaka* were employed for *Agnikarma.* In both the modalities the heat which is transferred to *Twak Dhatu* may act in three ways, i.e. due to *Ushna, Tikshna, Sukshma, Ashukari Guna* it removes the *Srotavarodha*, pacify the vitiated *Vata* and *Kapha Dosha* and maintain equilibrium. It increases the blood circulation to the affected site. More blood circulation flushes away the pain producing substances (P substance) and patient gets relief from symptoms. The therapeutic heat also increases the

Dhatvagni, which cause *Ama Pachana*. Further it can be endorsed that the heat pacifies the *Sheeta Guna* of *Vata* and *Kapha Dosha.*

Probable Mode of Action: *Agnikarma* using *Kshaudra* like substances is considered to aid the penetration of heat through *Sukshma Sira*. By the *Ushna* quality of *Kshaudra*, it pacifies both *Vata* and *Kapha*. By the *Laghu*, *Ruksha* and *Sukshma* properties it alleviates *Kapha. Panchadhatu Shalaka* has a considerably higher temperature than that of *Kshaudra* when employed for *Agnikarma*. But *Kshaudra* due to its higher specific heat (high heat retention capacity of sticky liquids) can effect a greater variation in the temperature of the tissue surface in contact and also that of the subsequent layers. Eventually the heat penetration will always be higher when such liquids are used for *Agnikarma*. The heat dissipation of *Kshaudra* is slow when compared with the hot *Panchadhatu Shalaka*, so the rate of heat transfer to the subcutaneous tissues will be more in *Tapta Kshaudra*. According to the relation between heat and nerves, with an increase in temperature, the nerve conduction will also increase and thereby an instant relief of the signs and symptoms can be noticed. Heat may stimulate the lateral Spinothalamic tract which leads to stimulation of descending pain inhibitory (DPI) fibres, which release endogenous Opoid peptide which binds with Opoid receptors at Substantia Gelatinosa and helps to inhibit the release the p-substance by pre synaptic inhibition and thus block the transmission of pain sensation.

CONCLUSION: On the basis of the observations from the study it may be concluded that *Agnikarma* using *Tapta Kshaudra* is more beneficial than *Agnikarma* using *Panchadhatu Shalaka* in the management of Carpal Tunnel Syndrome (*Manibandha Sandhi Sthita SnayugataVata*). No adverse effect was observed during study period in both Group A and Group B.

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Corresponding Author: Dr.Prasanth K S
PG Scholar, Dept.Shalyatantra, Alva's Ayurveda Medical College, Moodbidri,K.S.
Email: drprasanthks@gmail.com

Source of support: Nil:;Conflict of interest: None: Declared

Cite this Article as : Prasanth K S et al :A Comparative Study of Agnikarma with Tapta Kshaudra and Panchadhatu Shalaka in Carpal Tunnel Syndrome: IJAAR VOLUME III ISSUE III JUL-AUG 2017 Page No:677-683