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(RESEARCH ARTICLE)



## Efficacy of *Sida cordifolia* Linn. decoction as vehicle of drug (*anupanam*) in the management of joint disorders

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### Abstract

In 21<sup>st</sup> century, whole world is returning back to ancient life style. As a huge medical system, herbal drugs are very effective for many diseases. However, Arthritis also controls by herbal drugs even though not efficiency reducing the symptoms of joint pain. This is the identified problem. Therefore, this research tries to correct that problem by treating vehicle (*anupanam*) with herbal medicine formula. In commonly patients are suffering from joint pain caused by Arthritis. This research was finding-out the efficacy of Sittamatti (Bala- *Sida cordifolia* Linn) decoction as an *anupanam* (Vehicle of drug). Control clinical study measured to assess the effect of the treatment by significant relief of symptoms of Arthritis within three months. This research is clinical control study and qualitative analysis research. Selection of samples (60 samples) and same time preparation of our new research drug is initial works. There after data collections and observation of the progress of the effect of the research drug. Finally, analyzed by the tables, charts and statistical way. According to tables, charts results; every table explained various angle of collection of the data and observations with sum of numbers and percentage level. Male samples are 60%, and Females are 40% in total sample population in research. 73.3% - High Marked improvement, 26.6% - Moderate improvement is this research result of whole results. Therefore, *anupanam* with medicine (Group-I) is best than medicine without *anupanam* (Group-II). *Vatha Gajendra Singhe Rasa* with Sida decoction, *Mudakku Chooranam* with Sida decoction treatment are better clinically efficacy than *Vatha Gajendra Singhe Rasa* without Sida decoction, *Mudakku Chooranam* without Sida decoction treatment. In statistical result says, compare with *sample group-I & sample group-II* was 0.0001 (p value < 0.05) within three month of treatment. Finally, we concluded effectiveness of our vehicle with medicine most effective than medicine control Group -II for symptoms of joint disorder significantly. In Arthritis symptoms, Joint Pain, tenderness, limitation of movements and swelling was highly notified changes as reducing within three months all symptoms.

**Keywords:** *Sida cordifolia* Linn; Decoction; *Anupanam* (Vehicle of drug); Joint Pain; Ayurvedic medicines.

### 1. Introduction

Symptoms of Joint disorders are compared with symptoms of *keel vaatham* in siddha system of medicine. *Keel vaatham* is mentioned under *vaatha noi* by all Siddhars. It can define as a disease of joint with symptoms of joint pain, joint swelling, limitation and painful movements, restricted joint movement. Osteoarthritis is the most articular disorder begins asymptotically in the second and third decade and is extremely common by age 60 years. Almost all persons by age 40 years have some pathologic change in weight bearing joint particularly in knee joint. 40% females and 60% males have symptomatic Osteoarthritis. No treatment is available which can prevent the disease process. In medical science, mainly analgesics, anti-inflammatory drugs or finally surgery are the options for the treatment of Osteoarthritis. Considering all these factors, the present study was taken up with the objective to evaluate the efficacy of herbal medicine with vehicle (*Anupanam*) to *keel vaatham* (osteoarthritis). *Anupanam* is the main roll in administration of drug

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in Siddha system and Ayurvedic system of medicine. One medicine cures many diseases by changing of *Annupanam* is special characteristic of poly herbal medicine. Combination of *Vatha Gajendra Singhe Rasa* and *Mudakku Chooranam* medicines are normally reduce symptoms of Arthritis but this research enhances the most effective than other drugs for arthritis are medicine with *anupanam*. Selected commonly used anti-arthritis treatment plan and that involve to research for identify better treatment with *anupanam*.

*Sida cordifolia* (Bala, Country Mallow, Heart-Leaf Sida or Flannel Weed) is a perennial subshrub of the mallow family Malvaceae native to India & Sri Lanka. It has naturalized throughout the world, and is considered an invasive weed in Africa, Australia, the southern United States, Hawaiian Islands, New Guinea, and French Polynesia. The specific name, *cordifolia*, refers to the heart-shaped leaf. [6] Common Name: Indian Ephedra, Mallow plant, Janglimedhi, Bala, Vatya, Bariyar, Kharethi, Tamil: Sitamati / Chittamati, Sanskrit: Bala, Sinhala: Babila (Sulu boo Babila), English: Yellow sticky Mallon. Part Used: Roots and leaves, whole plant. [6] *Sida Cordifolia*, an erect, minutely hairy and branched under shrub with a firm woody stem and intricate branches, contains 0.8% to 1.2% of the alkaloid ephedrine. It has been used by Ayurveda as a rejuvenating herb and an aphrodisiac. [6]

### 1.1. Organoleptic Characters

Taste (*suwai*) – Astringent, Veerya (*thanmai*) – Cooling (Seetha), Viphaka (*pirivu*) – Sweet [3] Properties: *Sida cordifolia* has ephedrine and pseudo-ephedrine along with other compounds as active ingredients that stimulate the cardiovascular system and CNS. It is considered to have diaphoretic, diuretic, central nervous system stimulating and anti-asthmatic properties. The stem of *Sida cordifolia* contains a number of active compounds, including small amounts of an essential oil, 1-2% alkaloids composed mainly of ephedrine and pseudoephedrine, with ephedrine ranging from 30-90%, depending on the source. It is a rejuvenating herb, an aphrodisiac herb which helps in curing those diseases that occur due to inflammation of the nerves. [6] Actions: Emollient, Astringent, Stomachic, Diuretic [6]

### 1.2. Medicinal use

*S. cordifolia* is used in Ayurvedic medicine, known as "malva branca", is a plant used in the folk medicine for the treatment of inflammation of the oral mucosa, blenorrhoea, asthmatic bronchitis and nasal congestion, stomatitis, of asthma and nasal congestion and in many parts of Africa for various ailments, particularly for respiratory problems. It has been investigated as an anti-inflammatory, for treating cancer, and for encouraging liver re-growth. Due to its ephedrine content, it possesses psychostimulant properties, affecting the central nervous system and also the heart. [6] *Sida Cordifolia* has been used in India for over 2,000 years now to treat a variety of health disorders like bronchial asthma, cold & flu, chills, lack of perspiration, headache, nasal congestion, aching joints and bones, cough & wheezing, and edema. One of its uses is in weight loss too as the ephedrine alkaloids control metabolism in human body. It is one of the best medicines for Rheumatism, cardiac tonic. It is beneficial in nervous and urinary diseases, bleeding piles, hematuria, gonorrhoea, cystitis, leucorrhoea, chronic dysentery, nervous disorders, insanity, asthma and disorders of blood and liver. Fresh decoction mixed with ginger is used for intermittent fever with cold shivering fits. The root is pounded and applied for elephantiasis to reduce pain. The root is processed with milk and used internally and externally for hemiplegia, stiff neck, facial paralysis, diseases of the nervous system, and diseases of nose, ear, mouth and head. Its herbal extract or tea is used for obesity and obesity related disorders, especially in western countries. It is used for all kinds of detoxification and rejuvenation therapies like in medicated enema where its root extract is used for all kinds of nervous disorders like paralysis, arthritis etc. In one of the rejuvenation therapies named "Navara Kizhi", medicated Navara (rice) with milk and *Sida cordifolia* is applied all over the body or to a particular body part. In condition of sexual weakness, the milk extract of *Sida cordifolia* root is recommended as an effective remedy for sperm mobility and low sperm count disorders. [6]

### 1.3. Prepared Siddha Medicines

*Sittamati Kudineer*, *Bala vilva sundi Kudineer*, *Lipakathy Himbatu Kudineer*, *Thasamoola Kudineer*, *Seeraka Leheyam* *Karisalai Leheyam* *Thalankai Ennai*, *Arukam vaer Thailam*, *Araku Sandanaty Thailam*, *Sittamati ennai*, *Meha Sanjeevi* *Kuzhmbu*, *Sittamati Madaku Thailam* [1], [2].

### 1.4. Prepared Ayurveda Medicines

*Bala Arista*, *Dashamoolarista*, *Dashamooladi Quatha*, *Dantheemoola Bala Shuntyadi Quatha*, *Aravindasawa*, *Punarnavadyarista* [1], [2].

In this research selected 60 research samples. In 30 samples for only common treatment (control group) and other 30 samples involved with research *anupanam* with common treatment. This is conducted in District Ayurvedic Hospital, Mulliyawalai, Sri Lanka. Permission and Ethical Clearance are given by the Provincial Commissioner of Indigenous

medicine, Northern Province, Sri Lanka. Samples were follow-up with their measurements in once in two weeks altogether 03 months duration data collected and studied by scientific research methodology. In this research is help to prove scientifically that indigenous medical systems' theory as co-drug or *anupanam* for effective treatment and management of diseases. Objectives were; To relief the Symptoms of Arthritis through Herbal Medicine. To identify effectiveness of *anupanam*. To evaluate efficacy of combination of drug and *anupanam* for joint disorders.

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## 2. Material and methods

Type of Research: Control -Clinical Study

Research area: District Ayurvedic Hospital (DAH), Mullaitivu, Sri Lanka

Research Samples: 60 patients

Identification of Arthritis patients according to clinically diagnosis.

Parameters Measured

The parameters measured were both objective and subjective.

*Subjective parameters included pain, tenderness, swelling, and crepitation*

### 2.1. Inclusive criteria

Patients were eligible if they were 21–75 years of age, had according to the known joint disorder patients by past diagnostic medical report, were treated with diet, oral anti-arthritic agents, and had evidence of symptomatic symmetrical or Asymmetrical Arthritis.

### 2.2. Exclusive criteria

Were the following: Presence of foot ulcers, peripheral vascular disease (non-palpable foot pulses, intermittent claudication), myopathy, causes of Arthritis by significant neurological diseases, participation in a study of any investigational drug for Arthritis within the 3 months before the study, use of oral or external anti-arthritic agents within 1 month before the study, severe concomitant diseases, and pregnancy, lactation, or childbearing age without birth control devices. Recently fractured part pain involvement. any other NCDs or systemic diseases.

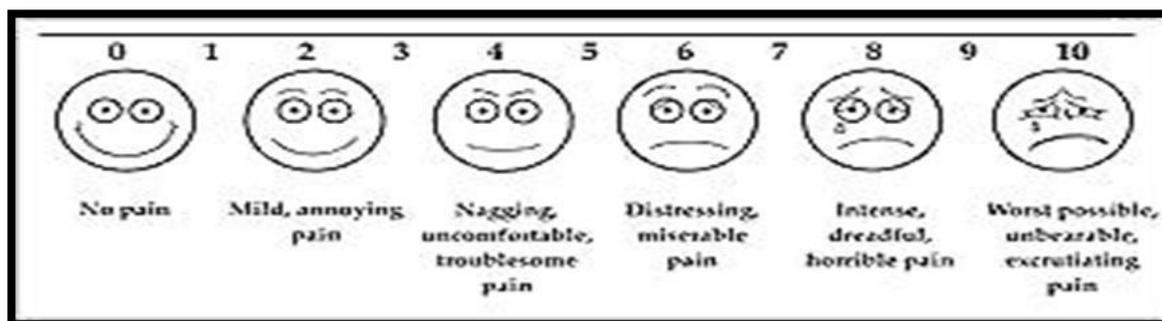
- Literature review
- 2.1) Identify and authenticate the drug materials including in the selected formula.
- Identify the treatment in Siddha Pharmacopoeia
- Making for sample and check the quality for phyto-chemicals & standardization
- Clinical test for the drug from 60 patients in OPD (Out Patient Department) and data collecting from a suitable Proforma
- Institutional Ethical Committee approval got from Provincial Department of Indigenous Medicine, Northern Province, Jaffna (No: NP/IEC/MUL/2013/001-C)
- Assessment Criteria

### Final Assessment Criteria

- High Marked. (not cured)
- Marked improvement.
- Moderate improvement.
- Mild improvement.
- Very mild.
- Not improvement.
- Aggressive.

### 2.3. Analysis of the data and making the thesis

Qualitative Scoring analysis:



**Score:**

0	1	2	3	4	5	6	7	8	9	10
<i>initial</i>										
Very Mild			Mild			Moderate			Severe	
<i>final</i>										
High Marked			Moderate			Mild			Very Mild	

### 2.4. Drug preparation

Prepared Research drug – vehicle of drug (*anupanam*) with medicine and control drug as without *anupanam* which as change compares.

#### 2.4.1. Research drug

#### 2.4.2. *Anupanam* (vehicle) Ingredients

Sittamatti *Sida cordifolia* Linn. Whole plant

(Decoction pack is in annexure)

#### 2.4.3. Method of preparation

Normal Decoction preparation. Add 08 cups of water then heat and reduction for 01 cup for 01 day.

Research drug: Medicine + *Anupanam* (*Anupanam*: Sittamatti decoction)

*Sida cordifolia* confirmed (Through Herbariums) by Dr. (Mrs). V. Sathiyaseelan, Senior Lecturer, Sectional Head, Materia medica, Unit of Siddha Medicine, University of Jaffna. And Dr. (Mrs). Sudeepa Sugathasa, Scientist (Pharmacognosy), In-Charge, Botany Section, Bandaranake Memorial Ayurvedic Research Institute (BMARI), Nawinna.

Control drug: Medicine only

### 2.5. Clinical study

Clinical trial for research drug and Compare drugs to 60 patients in OPD (Out Patient Department) and data collecting from a suitable Proforma.

### 2.5.1. Grouping the Samples

In this research, total sample divided into two (02) groups but all are same symptomatically Arthritis condition. Those two groups are given below,

- **Group I:** Arthritis patients with medicine + Sittamatti decoction treatment (30 patients).
- **Group II:** Arthritis patients with medicine without anupanam treatment without any decoction or liquid formulas (30 patients).

Treatment is as follows

#### Group: I (Research drug)

Medicine	Dosage	Period of intake	Vehicle (Anupana)
Vathagajendra singhe rasa [4]	02 pills	Twice a day	Sittamatti decoction
Mudakku Chooranam [1]	01g	Thrice a day	Sittamatti decoction

#### Group: II (Control drug)

Medicine	Dosage	Period of intake	Vehicle (Anupana)
Vathagajendra singhe rasa	02 pills	Twice a day	-
Mudakku Chooranam	01g	Thrice a day	-

### 2.5.2. Vatha Gajendra Singhe Rasa [4]

It is commonly used as anti-arthritis treatment in Sri Lanka. It is Ayurvedic Medicine.

### 2.5.3. Mudakku Chooranam [1]

It is commonly used as anti-arthritis treatment in Northern part of Sri Lanka. It is Siddha Medicine.

Combination of *Vatha Gajendra Singhe Rasa* and *Mudakku Chooranam* medicines are normally reduce symptoms of arthritis but this research enhance the most effective than other drugs for arthritis is medicine with *anupanam*.

### 2.5.4. Ethical Clearance

Ethical clearance got from Provincial Commissioner of Indigenous Medicine, Northern Province, Sri Lanka. (No: NP/IEC/MUL/2013/001-C)

### 2.5.5. Clinical Trial

Clinical consultation and follow-up the patients in District Ayurvedic Hospital (DAH), Mullaitivu, Sri Lanka.

## 2.6. Data Collection

Selected samples with modified Proforma.

Symptoms measured as qualitative measures with grading score.

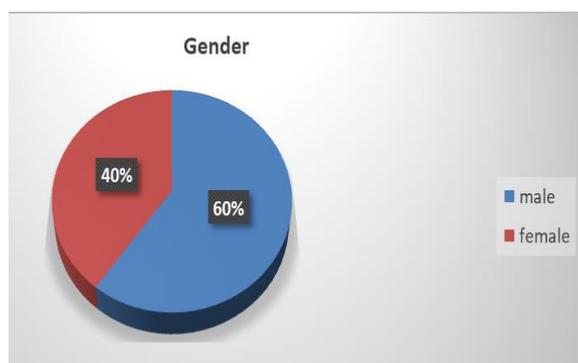
## 2.7. Statistical Analysis

Statistical analysis with Minitab software.

### 3. Results and discussion



**Figure 2** Anupanam as; Decoction pack of *Sida cordifolia* Linn.



**Chart 1** 12 samples are female of 30 total samples in research. This is 40% in total sample. 18 samples are male of 30 total samples in research. Male samples are 60% in total sample.

**Table 3** Samples and Main Complaint

No.	Sample No.	Sex	Age	Symptom
1	1	F	35	pain in both knee joint
2	2	M	38	pain and swelling in knee joint
3	3	M	29	tenderness in shoulder
4	4	M	45	pain in right knee joint
5	5	F	67	pain in left knee joint
6	6	F	70	pain in left knee joint
7	7	M	69	pain and swelling in knee joint
8	8	M	43	pain and swelling in knee joint
9	9	F	54	pain and swelling in knee joint
10	10	F	58	pain in both knee joint
11	11	F	39	pain in both knee joint
12	12	M	60	pain in both knee joint
13	13	M	55	pain in both knee joint
14	14	M	45	pain and swelling in knee joint
15	15	F	62	tenderness in shoulder
16	16	M	64	pain in right knee joint
17	17	F	58	pain in right knee joint
18	18	M	37	pain and swelling in knee joint
19	19	M	42	pain in both knee joint
20	20	M	40	pain in both knee joint
21	21	M	52	pain in both knee joint
22	22	F	46	tenderness in shoulder
23	23	M	49	pain in left knee joint
24	24	M	38	pain in right knee joint
25	25	M	45	pain in left knee joint
26	26	F	56	pain in right knee joint
27	27	F	52	pain and swelling in knee joint
28	28	M	59	pain and swelling in knee joint
29	29	F	60	pain in both knee joint
30	30	M	70	pain in both knee joint

Sample No, and their sex and age with main complaints of selected samples for clinical research. 30 samples list in table.

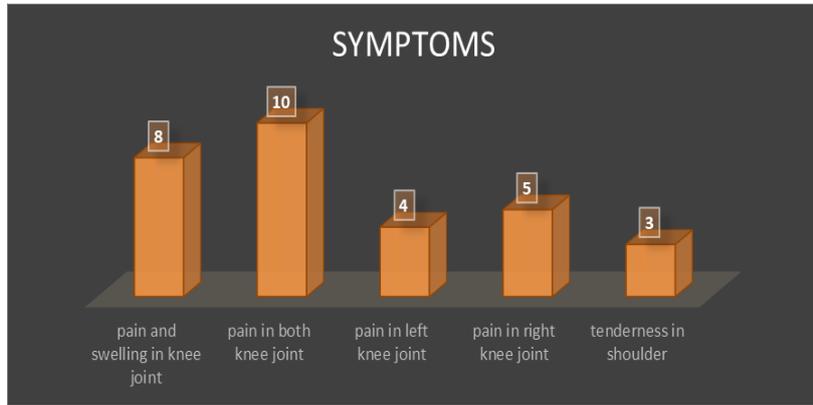


Chart 2 Symptoms of samples

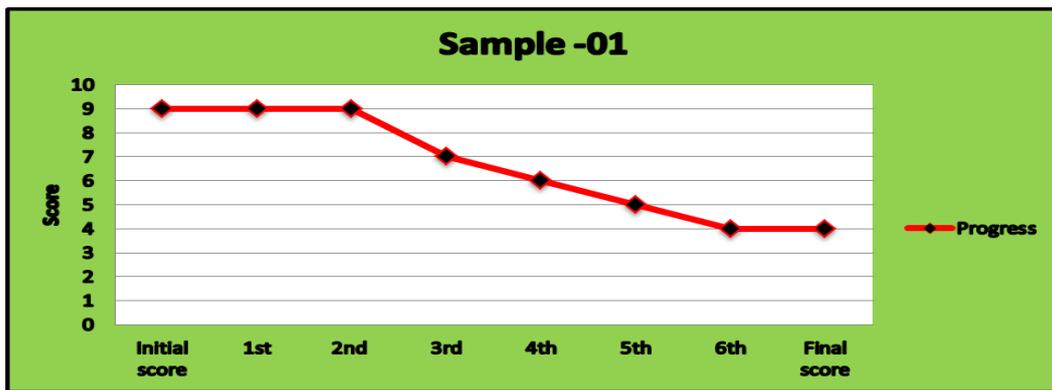


Chart 03 Once in two weeks follow-up the patients and their progress in each samples for research with grading

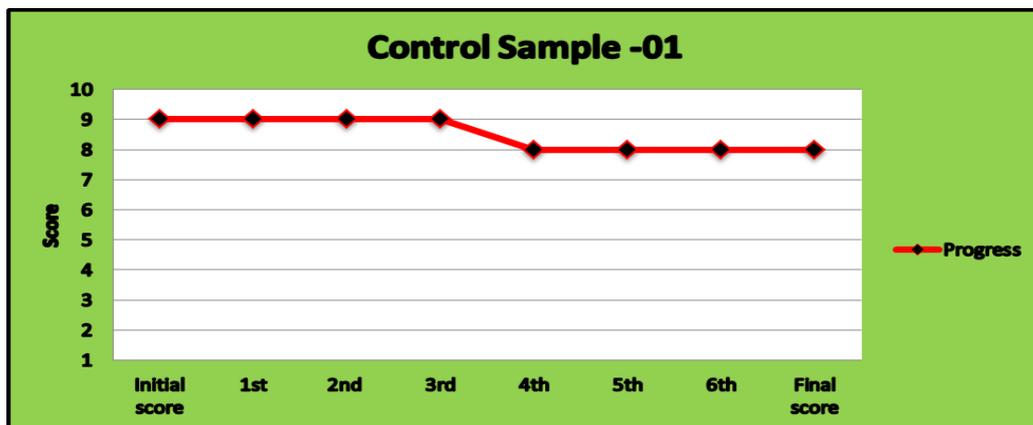


Chart 04 Once in two weeks follow-up the patients and their progress in each control samples for research with grading score.

**Table 4** Initial and final score of joint pain

Sample No.	Sex	Age	Symptom	Initial score	Final score
1	F	35	pain in both knee joint	9	4
2	M	38	pain and swelling in knee joint	8	4
3	M	29	tenderness in shoulder	5	1
4	M	45	pain in right knee joint	10	3
5	F	67	pain in left knee joint	7	2
6	F	70	pain in left knee joint	8	3
7	M	69	pain and swelling in knee joint	9	5
8	M	43	pain and swelling in knee joint	9	4
9	F	54	pain and swelling in knee joint	9	4
10	F	58	pain in both knee joint	7	2
11	F	39	pain in both knee joint	5	1
12	M	60	pain in both knee joint	8	2
13	M	55	pain in both knee joint	10	2
14	M	45	pain and swelling in knee joint	9	2
15	F	62	tenderness in shoulder	9	3
16	M	64	pain in right knee joint	7	1
17	F	58	pain in right knee joint	5	1
18	M	37	pain and swelling in knee joint	9	1
19	M	42	pain in both knee joint	8	2
20	M	40	pain in both knee joint	5	1
21	M	52	pain in both knee joint	10	1
22	F	46	tenderness in shoulder	7	1
23	M	49	pain in left knee joint	8	2
24	M	38	pain in right knee joint	9	2
25	M	45	pain in left knee joint	9	1
26	F	56	pain in right knee joint	9	1
27	F	52	pain and swelling in knee joint	8	1
28	M	59	pain and swelling in knee joint	10	1
29	F	60	pain in both knee joint	9	2
30	M	70	pain in both knee joint	7	1

End of the research finding is above table. Initial score of the samples and final score of samples are listed above. (n=30)

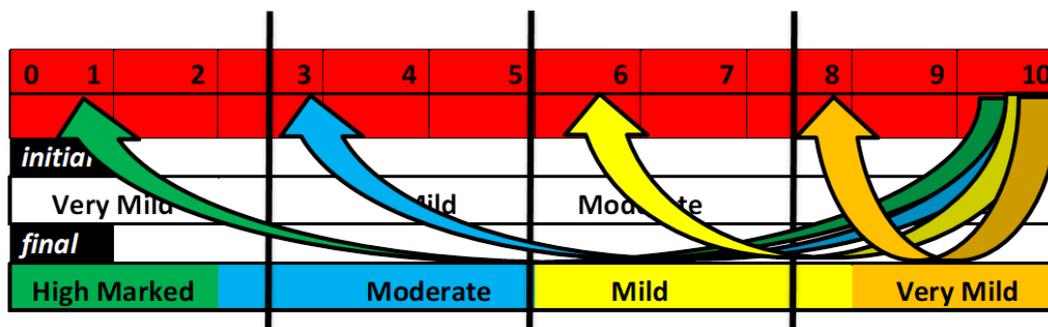


Figure 3 Obtained result through the pain score

#### 4. Discussion

Symptoms of joint disorders; Symptoms of Joint disorders are compared with symptoms of *keel vaatham* in siddha system of medicine. *Keel vaatham* is mentioned under *vaatha noi* by all Siddhars. It can define as a disease of joint with symptoms of joint pain, joint swelling, limitation and painful movements, restricted joint movement. Results are;

- 12 samples are female of 30 total samples in research. Females are 40% in total sample.
- 18 samples are female of 30 total samples in research. Male samples are 60% in sample
- 08 samples complaint pain and swelling in knee joint. This is 26.6% of research samples.
- 10 samples are complaint pain in both knee joints. This is 70% of total samples.
- Only 04 samples are complaint pain in left knee joint. This is 13.3% of total sample.
- Only 05 samples are complaint pain in right knee joint. This is 16.6% of sample.
- Only 03 samples are complaint tenderness in shoulder. This is 10% of samples research.
- End of the research finding is above table. Initial score of the samples and final score of samples are listed above. (n=30) Assessment of scoring;
- Initial score is 05 - 13.3%, Initial score is 07 - 16.6%, Initial score is 08 - 20%, Initial score is 09 - 36.7%, Initial score is 10 - 13.3% and Final score is 01 - 43.3%, Final score is 02 - 30%, Final score is 03 - 10%, Final score is 04 - 13.3%, Final score is 05 - 03.3%

#### Grading Score

Final Score is (01, 02)- 43.3% + 30.0% = 73.3% - High Marked improvement

Final Score is (03, 04, 05) 10% + 13.3% + 03.3% = 26.6% - Moderate improvement

73.3% - High Marked improvement, 26.6% - Moderate improvement is this research result of whole result. Therefore *anupanam* with medicine (Group-I) is best than medicine without *anupanam* (Group-II). *Vatha Gajendra Singhe Rasa* with Sida decoction, *Mudakku Chooranam* with Sida decoction treatment are better clinically efficacy than *Vatha Gajendra Singhe Rasa* without Sida decoction, *Mudakku Chooranam* without Sida decoction treatment.

#### 5. Conclusion

In statistical result says, compare with sample group-I & sample group-II was 0.0001 (p value < 0.05) within three month of treatment. Finally, we concluded effectiveness of our vehicle with medicine most effective than medicine control Group -II for symptoms of joint disorder significantly.

#### Compliance with ethical standards

#### Acknowledgments

I sincerely thank to Dr. (Mrs). S. Thurairatnam, Provincial Commissioner of Indigenous Medicine, Northern Province for grant permission to do research and clearances of ethics of clinical trial research. I thank to authentication of raw material (*Sida cordifolia*) by Dr. (Mrs). Vivian Sathiyaseelan, Senior Lecturer, In-Charge of Materia Medica, Unit of Siddha medicine, University of Jaffna. And Scientist (Pharmacognosy) Mrs. Sudeepa Sugathadasa In-Charge Botany section,

BMARI, Nawinna, Sri Lanka. Finally thank to labourers of District Ayurvedic Hospital (DAH), Mullaitivu for collecting, preparation and packing of research decoction packs of research drug.

#### *Disclosure of conflict of interest*

The author declared that no conflict of interest.

#### *Statement of ethical approval*

This research study's Clinical trial and follow-up the patients in District Ayurvedic Hospital (DAH), Mullaitivu, Sri Lanka with the approval of Ethical committee clearance got from Provincial Commissioner of Indigenous Medicine, Northern Province, Sri Lanka. (No: NP/IEC/MUL/2013/001-C)

#### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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### Author's short biography



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Dr. S. R. Pholtan Rajeev, finished BSMS in Jaffna University, Sri Lanka and worked as Medical Officer at District Ayurvedic Hospital, Mullaitivu, Sri Lanka and Central Ayurvedic Dispensary in Vaharai, Batticaloa, Sri Lanka as contract basis. Finally, working as Medical Officer in Provincial Department of Indigenous Medicine, Eastern Province, Trincomalee, Sri Lanka since 2014 permanently. Now doing Post Graduate – MD(S) in The Tamil Nadu Dr. M. G. R. Medical University, Chennai, Tamil Nadu from 2018.