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A comparative clinical study on the effect of *Mustadi* and *Devadarvadi Upanaha Sveda* in *Sandhigata Vata*

H. V. Happy¹, Vikram Kumar²

¹Post Graduate Scholar, Department of PG Studies in Panchakarma, Alvas Ayurveda Medical College, Moodbidri, Karnataka, India.

²Associate Professor, Department of PG Studies in Panchakarma, Alvas Ayurveda Medical College, Moodbidri, Karnataka, India.

ABSTRACT

Introduction: *Sandhigata Vata* is one among the *Vatavyadhi* characterised by *Vatapurna Driti Sparsha Shotha* (swelling), *Prasarana Aakunchanayo Pravruttscha Savedana* (pain during flexion and extension) and *Atopa* (crepitus). Due to resemblance in signs and symptoms it can be correlated to Osteoarthritis. According to W.H.O, Osteoarthritis is second commonest musculoskeletal problem among world population (30%) after back pain (50%). **Objective:** To compare and evaluate the efficacy of *Mustadi* and *Devadarvadi Upanaha Sveda* in *Sandhigata Vata*. **Methods:** 42 patients fulfilling the diagnostic and inclusion criteria of *Sandhigata Vata* (Osteoarthritis) for the study were randomly assigned into two equal groups using lottery method, out of which 40 patients completed the treatment. Group MU consisting of 20 patients were treated with *Mustadi Upanaha Churna* for 7 days and Group DU consisting of 22 patients were treated with *Devadarvadi Upanaha Churna* for 7 days with 2 dropouts. **Results:** Both the groups MU and DU showed statistically highly significant results in all the criteria's within the group with ($p < 0.001$). Between the group there is statistically highly significant result seen in tenderness and Womac Score with ($p < 0.05$). **Conclusion:** *Mustadi Upanaha Sveda* showed statistically better results in terms of Range of motion and WOMAC Score and percentage wise maximum relief was seen in *Mustadi Upanaha Sveda*.

Key words: *Sandhigata Vata*, *Mustadi Upanaha*, *Devadarvadi Upanaha*, *Sveda*, *Osteoarthritis*

INTRODUCTION

Svedana is a variety of *Shadvidhopakrama*.^[1] It is helpful in neutralizing *Sthambha*, *Gourava* and *Seetha*.^[2] Ayurveda has mentioned four major types of *Sveda*. They are *Tapa Sveda*, *Usma Sveda*, *Upanaha Sveda* and *Drava Sveda*.^[3] *Upanaha* is a type of *Sveda* which is done by application of warm paste of *Vata* mitigating drugs macerated with *Amla Kanji* and added with more salt and fats, made unctuous and

tied on the affected body part.^[4] *Upanaha Sveda* is mainly indicated in *Atyanta Ruja* (severe pain), *Gatra Sankoca* (contracture of body parts), *Gatra Stabdha* (stiffness of body parts).^[5]

Vatavyadi may manifest due to many pathogenesis.^[6] *Gata Vata* is one such pathology which produce various symptoms based on the site of manifestation.^[7] *Vata* is capable to reach various sites viz *Dhatu*, *Upadhatu*, *Ashaya*, *Avayava* and *Indriya* and produce symptoms of varied degree and *Sandhigata Vata* is one among them.^[8] *Sandhigata Vata* is commonly confronted clinical condition mostly affects the Knee joints.^[9] It is characterized by *Sandhi Shoola* (joint pain), *Shotha* (swelling), *Atopa* (crepitus) and *Prasarana Aakunchanayo Savedana* (pain during flexion and extension).^[10]

Osteoarthritis is a common degenerative joint disorder particularly seen in geriatric practise affecting more than 70% adults between 55-78 years of age.^[11] Osteoarthritis of knee commonly affects

Address for correspondence:

Dr. H. V. Happy

Post Graduate Scholar, Department of PG Studies in Panchakarma, Alvas Ayurveda Medical College, Moodbidri, Karnataka, India.

E-mail: happyhv918@gmail.com

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people over 45 years of age but can occur at any age.^[12] Pathologically, it may be defined as a condition of synovial joints characterised by focal loss of articular hyaline cartilage with proliferation of new bone & remodelling of joint contour. Inflammation is not a prominent feature in it.^[13] Knee being the most important weight bearing joint in the body, gets affected by Osteoarthritis resulting in marked work disability. Osteoarthritis is the leading cause of disability in India affecting over 15 million Indians each year. According to W.H.O., Osteoarthritis is second commonest musculoskeletal problem among world population (30%) after back pain (50%). Statistics indicates that 25% females and 16% males have symptomatic Osteoarthritis and by 40 years of age about 90% of the people show radiographic evidence of Osteoarthritis which may or may not cause symptoms.^[14] In *Sandhigata Vata* and Osteoarthritis joint swelling, pain after overuse and restricted range of movement are common features. So, *Sandhigata Vata* can be readily correlated to Osteoarthritis due to the resemblance in signs and symptoms.

Ayurveda classics highlights *Sneha Upanaha*, *Agnikarma*, *Bandhana* and *Unmardhana* as various choice of treatments in the management of *Sandhigata Vata*. '*Sthanad Jayet-Hi Purvam*'^[15] is a main principle of treatment in Ayurveda. Therefore, if the *Upanaha Sveda* is applied directly on the affected joint then it may provide better relief. *Mustadi Upanaha Sveda* consists of *Musta* (*Cyperus rotundus*), *Kinva*, *Tila* (*Sesamum indicum*), *Kusta* (*Saussurea lappa*), *Surahva* (*Cedrus deodara*), *lavana*, *Tagara* (*Valeriana wallichii*), *Dadhi*, *Ksheera*, *Chatur Sneha*.^[16] As per the fundamentals of Ayurveda the pain and inflammation in any part is associated with vitiation of three *Dosa* i.e., (*Vata*, *Pitta* and *Kapha*). As most of the contents of *Mustadi Upanaha* is having three *Dosa Shamaka* property hence, the application will be effective in the management of *Sandhigata Vata*. *Devadarvadi Upanaha* consists of *Devadaru* (*Cedrus deodara*), *Rasana* (*Pluchea lanceolate*), *Jatamansi* (*Valeriana wallichii*), *Kustha* (*Sauserra lappa*), *Kulattha* (*Dolichos biflorus*), *Masha* (*Phaseolus mungo*), *Yava*,

Godhuma (*Triticum aestivum*), *Eranda* (*Ricinus communis*). Previous research work of *Devadarvadi Upanaha*, a folklore formulation showed a significant result in the same condition.^[17]

Hence, this study is intended to compare the effect of *Upanaha Sveda* performed with *Mustadi Churna* and *Devadarvadi Churna* in *Sandhigata Vata* (Osteoarthritis of Knee joint).

OBJECTIVES OF THE STUDY

1. To evaluate the efficacy of *Mustadi Upanaha Sveda* in the management of *Sandhigata Vata*.
2. To evaluate the efficacy of *Devadarvadi Upanaha Sveda* in the management of *Sandhigata Vata*.
3. To compare the efficacy of *Mustadi Upanaha Sveda* and *Devadarvadi Upanaha Sveda* in the management of *Sandhigata Vata*.

MATERIALS AND METHODS

A Comparative Clinical Study including 42 patients fulfilling the diagnostic and inclusion criteria of *Sandhigata Vata* (Osteo Arthritis of Knee Joint) were selected for the study and randomly assigned into two equal Groups MU (*Mustadi Upanaha Sveda*) & Group DU (*Devadarvadi Upanaha Sveda*) by lottery method. The patients were diagnosed based on the clinical signs and symptoms of *Sandhigata Vata* like *Sandhi Shoola* (Pain in knee joints), *Sandhi Shotha* (Knee joint swelling), *Sandhi Atopa* (Crepitation), *Prasaarana Aakunchanayo Pravruttscha Sa Vedana* (Pain during flexion and extension) and Tenderness.

Inclusion Criteria

- Patients fulfilling the diagnostic criteria of *Sandhigata Vata*
- Patient's age group between 30 to 70 years of either sex.
- Patients who are fit for *Upanaha Sveda*

Exclusion Criteria

- Patients with Tuberculosis, Secondary arthritis, Rheumatoid arthritis, Psoriatic arthritis Gouty arthritis, Congenital bony deformity of Knee joint

- Patients having history of joint trauma, secondary and other systemic illness.

Trial Drug - Mustadi Upanaha Churna

Table 1: Pharmacodynamics of the Drugs in Mustadi Upanaha

SN	Drug Name	Karma
1.	Musta	Kaphapittahara
2.	Kinva	Vatahara
3.	Tila	Kaphavatahara
4.	Kusta	Kaphavatahara
5.	Devadaru	Kaphavatahara
6.	Tagara	Tridosahara
7.	Dadi	Vatahara
8.	Ksheera	Vata-Pittahara
9.	Ghrita	Vata Pittahara
10.	Taila	Vata Kaphahara
11.	Vasa	Vatahara
12.	Majja	Vatahara
13.	Saindhava Lavana	Tridosahara

Standard Drug - Devadarvadi Upanaha Churna

Table 2: Pharmacodynamics of the Drugs in Devadarvadi Churna

SN	Drug Name	Karma
1.	Devadaru	Kaphavatahara
2.	Rasna	Kaphavatahara
3.	Jatamansi	Tridosahara
4.	Kusta	Kaphavatahara
5.	Kulatha	Kaphavatahara

6.	Masha	Vatahara
7.	Yava	Kaphahara
8.	Godhuma	Vatapittahara
9.	Eranda	Kaphavatahara
10.	Tila Taila	Vata Kaphahara
11.	Kanji	Kapha Vatahara
12.	Saindhava Lavana	Tridosahara

Table 3: Results of standardization parameters of Mustadi Upanaha Churna and Devadarvadi Upanaha Churna.

Parameter	Results n = 3 %w/w	
	Mustadi Upanaha Churna	Devadarvadi Upanaha Churna
Loss on drying	11.69	11.20
Total Ash	6.18	7.24
Acid Insoluble Ash	2.09	2.10
Water soluble Ash	1.1	1.7
Alcohol soluble extractive value	15.40	7.58
Water soluble extractive value	18.89	12.79

Remarks

The given sample of Mustadi Upanaha Churna and Devadarvadi Upanaha has been standardized as per standard testing protocol.

Procedure

Procedure of Upanaha (Group MU)

SN	Procedure	Preparation
1.	Poorva Karma	140g of Mustadi Churna and 60g of Godhuma Churna (wheat flour) is taken and made into a paste by adding 20ml of four Snehas i.e., Ghrita (ghee), Taila (sesame oil), Vasa (muscle fat), Majja (bone marrow) and Drava

		<i>Dravya Dadhi</i> (curd) and <i>Ksheera</i> (milk) is added. Thus, prepared semi solid paste is warmed and kept ready.
2.	<i>Pradhana Karma</i>	Patient is asked to lie down in supine position or to sit comfortably with exposed knee joint. <i>Sthanika Abhyanga</i> with <i>Moorchita Tila Taila</i> was done for 15 minutes and <i>Nadi Sveda</i> for 5 minutes. Then warmed paste of thickness of 0.5cm was applied over the <i>Janusandhi</i> then it was covered with <i>Eranda Patra</i> and it was firmly bandaged with cotton or <i>Khora</i> cloth.
3.	<i>Paschat Karma</i>	<i>Upanaha</i> was retained for 12 hours and then it was removed and the part was cleaned with warm water.

condition was done based on the detailed case proforma adopting standard method of scoring of subjective and objective parameters which were analyzed statistically using Paired ‘t’ test within the group and Unpaired ‘t’ test between two groups.

Subjective Criteria	Objective Criteria
WOMAC Score	Swelling Tenderness Crepitus Range of Movements of joints

Table 4: scoring pattern of subjective criteria (WOMAC score)

Procedure of Upanaha (Group DU)

SN	Procedure	Preparation
1.	<i>Poorva Karma</i>	140g of <i>Devadarvadi Choorna</i> and 60g of <i>Godhuma Choorna</i> (wheat flour) were made into a paste by adding 20 ml of <i>Tila Taila</i> (Sesame oil), <i>Kanji</i> (sour liquid) and <i>Saindhava Lavana</i> (Rock Salt) sufficient quantity. Thus, prepared semi solid paste was warmed and kept ready.
2.	<i>Pradhana Karma</i>	Patient is asked to lie down in supine position or to sit comfortably with exposed knee joint. <i>Sthanika Abhyanga</i> with <i>Moorchita Tila Taila</i> was done for 15 minutes and <i>Nadi Sveda</i> for 5 minutes. Then warmed paste of thickness of about 0.5cm were applied over the <i>Janusandhi</i> then it was covered with <i>Eranda Patra</i> and knee joint is firmly bandaged with cotton or <i>Khora</i> cloth.
3.	<i>Paschat Karma</i>	<i>Upanaha</i> was retained for 12 hours, and then removed and the part was cleaned with warm water.

Pain		0	1	2	3	4
Pain	1. Walking					
	2. Stair Climbing					
	3. Nocturnal					
	4. Rest					
	5. Weight Bearing					
Stiffness	6. Morning Stiffness					
	7. Stiffness occurring later in the day					
Physical Function	8. Descending Stairs					
	9. Ascending Stairs					
	10. Rising from Sitting					
	11. Standing					
	12. Bending to Floor					
	13. Walking On Flat Surface					
	14. Getting In /Out Of Car					
	15. Going Shopping					
	16. Putting On Socks					
	17. Lying In Bed					

Study duration of Group MU & Group DU: 7 days.

Follow Up of Group MU & Group DU: 15th day, 30th day

Assessment Criteria

Patients were assessed before treatment on 0th day and after treatment on 7th day. Assessment of the

18. Taking Of Socks					
19. Rising From Bed					
20. Getting In /Out Of Bath					
21. Sitting					
22. Getting On/Off Toilet					
23. Heavy Domestic Duties					
24. Light Domestic Duties					

Total Score: _____ /96 = _____%

Table 5: Scoring pattern of objective criteria

Swelling	No swelling	0
	Mild swelling	1
	Moderate swelling	2
	Severe swelling	3
Tenderness	No tenderness	0
	Pt complaints of pain	1
	Pt complaints of pain and wincing	2
	Pt withdraws the joint	3
Crepitus	No crepitus	0
	Palpable crepitus	1
	Audible crepitus	2
Range of movement of joints with Goniometer	Full range of the joint movement	0
	>50% and <full range of joint movements	1
	Upto 50% of the joint movement	2
		3
	No movement	

Table 6: Sample Size

SN	Group	Registered	Completed	Dropout
1.	Total	42	40	2
2.	Group MU	20	20	0
3.	Group DU	22	20	2

OBSERVATIONS

A total of 42 patients fulfilling the inclusion criteria of *Sandhigata Vata* were studied in two Groups "MU" and "DU" consisting of 20 patients in each group with two dropouts registered in Group "DU". As per the prepared proforma, observations were made regarding the incidence of Age, Sex, Religion, Occupation, Socio-Economic status, Diet, *Prakruti*, Chronicity etc.

Table 7: Observation on different characteristic predominance

Characters	Predominance	Percentage
Age	41-50 Years	33.33%
Sex	Females	55 %
Religion	Hindu	79%
Socio-Economical Status	Middle Class	64.2%
Occupation	Job Labour	66.6%
Diet	Mixed	90.5%
Addiction	No Addiction	75%
Prakruti	Vata-Kapha	53%
Bodyweight	Overweight	60%
Vyayama Shakti	Avara	47.6%
Vaya	Vruddha	52.8%
Chronicity	2 Year and Above	64.28%

RESULTS

Mustadi Upanaha provided highly significant relief ($p < 0.001$) in Swelling, Tenderness, Crepitus, Range of Movement and WOMAC Score.

Table 8: Effect of Mustadi Upanaha Sveda on 20 patients of Sandhigata Vata.

Subjective & Objective Criteria	BT Mean	AT Mean	D AY 15	D AY 30	%	SD	SE	t value	p value
Swelling	1.20	0.10	0.10	0.15	91.6	0.30	0.06	6.85	<0.001
Tenderness	2.15	0.20	0.50	0.35	90	0.41	0.09	10.56	<0.001
Crepitus	1.55	0.80	0.60	0.60	48	0.41	0.09	5.25	<0.001
Range of Motion	1.20	0.60	0.75	0.75	50	0.51	0.11	5.33	<0.001
Womac Score	47.3	23.5	22.7	22.4	50	12.90	2.88	9.21	<0.001

Devadarvadi Upanaha provided highly significant relief (p<0.001) in Swelling, Tenderness, Crepitus, Range of Movement and WOMAC Score.

Table 9: Effect of Devadarvadi Upanaha Sveda on 20 patients of Sandhigata Vata

Subjective & Objective Criteria	BT Mean	AT Mean	Day 15	Day 30	%	SD	SE	t value	p value
Swelling	1.15	0.15	0.20	0.10	86.95	0.36	0.08	6.164	<0.001
Tenderness	1.45	0.50	0.30	0.45	65	0.51	0.11	6.190	<0.001
Crepitus	1.45	0.85	0.75	0.70	41	0.36	0.08	5.33	<0.001
Range of Motion	1.20	0.65	0.65	0.50	45	0.48	0.10	4.81	<0.001
Womac Score	49.10	32.45	33.40	33.55	34	11.54	2.58	8.76	<0.001

In intergroup comparison, WOMAC Score and Tenderness is highly significant at (P<0.05). Swelling, Crepitus, Range of motion are not statistically significant at (P>0.05).

Table 10: Comparison between two group.

Subjective and Objective Criteria	Mean Score Group MU	Mean Score Group DU	t Value	p Value
Swelling	1.10	1.00	0.438	p>0.05
Tenderness	1.95	0.95	4.166	p<0.05
Crepitus	0.75	0.60	0.825	p>0.05
Range of Motion	0.60	0.55	0.312	p>0.05
WOMAC Score	23.80	16.65	2.231	P<0.05

The percentage of improvement in Group MU on Swelling is 92%, Tenderness is 90%, Crepitus is 48%, Range of movement & Goniometric examination is 50%, Womac Score is 50%. The percentage of improvement in Group DU on Swelling is 87%, Tenderness is 65%, Crepitus is 41%, Range of movement & Goniometric examination is 45%, Womac Score is 34%.

Table 11: Comparative results of Group MU and Group DU percentage wise relief

Characteristics	Group- MU		Percentage of relief	Group- DU		
	Mean score			Mean score		
	BT	AT		BT	AT	
Swelling	1.20	0.10	92 %	1.15	0.15	87%
Tenderness	2.15	0.20	90 %	1.45	0.50	65%
Crepitus	1.55	0.80	48 %	1.45	0.80	41%

ROM	1.20	0.60	50 %	1.20	0.65	45%
Womac Score	47.3	23.5	50 %	49.10	32.45	34%

Table 12: Overall Effect of the Treatment

Effect of Treatment	Number of Patients			Percentage of Relief	
	Group MU	Group DU	Total	Group MU	Group DU
Unchanged (0%)	0	0	0	0%	0%
Mild Improvement (0-25%)	2	6	8	15%	30%
Moderate Improvement (26-50%)	6	8	14	25%	40%
Marked Improvement (51-75%)	11	6	17	55%	30%
Complete	1	0	1	5%	0%

Fig 1: Effect of therapy on Group MU

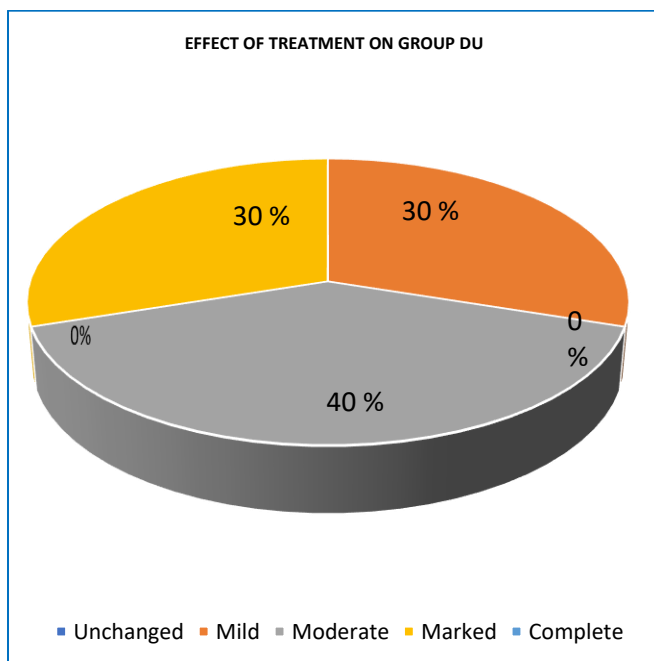
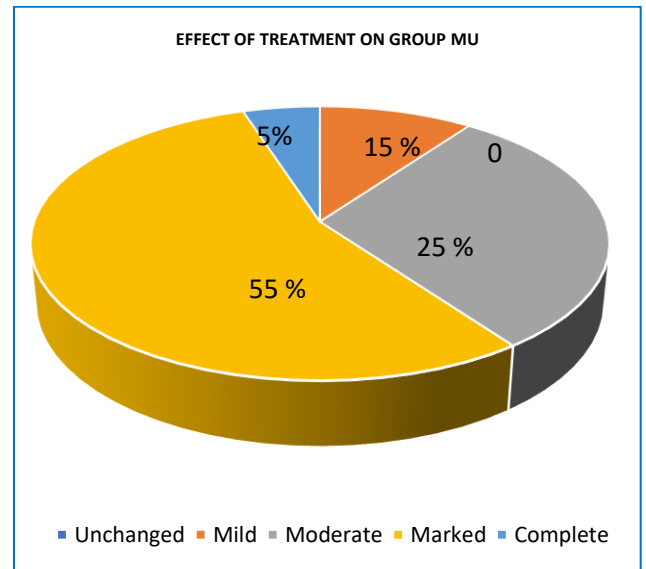


Fig 2: Effect of therapy on Group DU



DISCUSSION

Probable mode of action

Sandhigata Vata is the most common disorder arising with greater number of affected populations in the world. Sandhigata Vata may be seen in two different conditions one in Vrudhnavastha and other due increased pressure on the knee joints due to Ativyayama or Sthula Sharira. Acharya Susruta has mentioned specific treatment for the Sandhigata Vata i.e., Snehana, Upanaha, Agnikarma, Bandhana and Unmardana. The application of heat with the paste of Vatahara Choorna's over the joint may help in combating many of the symptoms as Ushna Guna pacifies Vata. Svedana Karma relieves Stambha (stiffness), Gaurava (heaviness), Sheeta (coldness) and induces Sveda (sweating).

Due to increased temperature produced the harmful metabolic waste are removed through increased blood circulation and sweat. The action of the skin is coordinated with the functions of other excretory organs. The secretion of sweat is under nervous control, especially autonomous. Thus, sudation can bring about changes indirectly on the autonomic nervous and the heat can bring about changes indirectly on the autonomic nervous system and the heat can bring changes in conduction of nerve stimuli there by acting over the pain stimuli. The application of heat promotes local circulation and metabolic

activities and opens the pores of the skin to permit transfer of medicaments and nutrients towards the needed sites.

Seven days course of *Upanaha Sveda* was given to the patients of both the groups. The *Upanaha Sveda* is kept for a period of 12 hours. This is to increase the bioavailability of the drug to the affected area. Transdermal absorption depends upon the lipid solubility of the drug. Drugs of lipid soluble carriers can penetrate the epidermis, as it is a lipid barrier. Once the drug reaches the underlying tissues it will be absorbed into the circulation. Suspending the drug in oily vehicle can enhance absorption through the skin. Because hydrated skin is more permeable than dry skin.

Discussion on Observation

It was observed from the clinical study in 40 patients, that age incidence of the disease was maximum in the patients of age group 41-50 years (33.33%). This supports that when a person is nearer to *Vardhakya Avastha*, process of degeneration starts with aggravation of *Vata Dosha*. During this period, the *Vata Dosha* works in destructive way results in the *Bala and Dhatu Kshaya*. Osteoarthritic changes starts more commonly in this decade of life. 55% of the patients were female and even the universal data says the prevalence degenerative changes more in females as bone mass density in females is more reduced than comparing to males. Different prevalence studies revealed that the Osteoarthritic changes and its manifestation exist in a female to male ratio of 3:1.50% of the patients were laborer's, the nature of work in the patients of present study was working in standing position, *Anashana, Alpashana, Ativyayama* and *Vega Dharana*, makes *Vata Prakopa* in a short duration which can have an influence on *Sandhigata Vata*.

It was noticed that in some patients treated with *Devadarvadi Upanaha Sveda* with *Pitta-Kapha Prakruti* were getting rashes and itching sensation after the removal of *Upanaha*. In such patients *Eladi keram* was applied externally. This may be due the fact that *Svedana* is contraindicated in *Pitta Prakruti* persons.

Discussion on Result

Both the group *Mustadi* and *Devadarvadi Upanaha Sveda* provided statistically highly significant result in all the signs and symptoms within the group with ($p < 0.001$). Between the groups there was statistically highly significance seen in tenderness and Womac Score in *Mustadi* Group with ($p < 0.05$). The percentage of improvement in Group MU on Swelling is 92 %, Tenderness is 90 %, Crepitus is 48%, Range of movement & Goniometric examination is 50 %, Womac Score is 50%. The percentage of improvement in Group DU on Swelling is 87%, Tenderness is 65%, Crepitus is 41%, Range of movement & Goniometric examination is 45%, Womac Score is 34%. Based on the above results it can be said that the effect of *Mustadi Upanaha Sveda* was better from *Devadarvadi Upanaha Sveda*. The drugs in Group "MU" are having *Kapha-Vata Shamana, Shothahara, Vedanasthapaka, Svedanajana* action. The homologous paste was prepared by adding *Chatu Sneha* which promotes physical strength over *Asthi* and *Sandhi*. It is considered as best *Sneha Dravvas* among all. So, this enhances the action on *Sandhigata Vata* and it is *Tridosahara* and *Dadi-Ksheera* as a *Drava Dravya* medium which is *Vata-Pittahara* and promotes physical strength over *Asthi* and *Sandhi*. It is considered as best *Sneha Dravvas* among all. So, this enhances the action on *Sandhigata Vata*.

The drugs in Group "DU" are having *Kapha-Vata Shamana, Shothahara, Vedanasthapaka* and *Svedanajana* action. The homologous paste was prepared by adding *Tila Taila* and *Kanji* as a *Drava Dravya* medium both are having *Vedanasthapaka, Shothahara, Svedanajana* action. The drugs are *Vata Shamaka* by virtue of its *Usna, Snigdha Guna* it combats the properties of *Vata* like *Sheeta, Ruksha* and *Laghu Guna* and mitigates the provoked *Vata* dislodged in *Sandhi*.

CONCLUSION

Sandhigata Vata is a type of *Vata Vyadhi* commonly associated with *Vardhakya Avastha, Dhatu Kshaya* and *Madhyama Rogamargajanyaja*. *Upanaha Sveda* is one among the treatment modality and it's a type of

Shamananga Sveda useful in relieving the *Stambha*, *Gaurava*, *Sheetata* and *Shoola*. Group 'MU' provided better relief in majority of the signs and symptoms in comparison with Group 'DU'. Statistically *Mustadi Upanaha* and *Devadarvadi Upanaha* provided highly significant result in all the signs and symptoms within the group with ($p < 0.001$). Between the groups there was statistically highly significance seen in tenderness and Womac Score with ($p < 0.05$). Hence, *Mustadi Upanaha Sveda* has better effect than *Devadarvadi Upanaha Sveda* in *Sandhigata Vata*.

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