



## UNIQUE JOURNAL OF AYURVEDIC AND HERBAL MEDICINES

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Research Article

### A CLINICAL STUDY ON EFFECT OF SELECTED RASAYANA ON JANU SANDHIGATA VATA (OSTEOARTHRITIS OF KNEE JOINT)

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Received 24-12-2014; Revised 22-01-2015; Accepted 20-02-2015

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#### ABSTRACT

Sandhigatavata (Osteoarthritis) is a degenerative joint disorder occurs due to dhatukshaya and vata vitiation. In Asians, Hip Osteoarthritis is less common and Knee Osteoarthritis is more common than in Europeans. The line of management should be towards nourishment of degenerated joints. Rasayana are well known for their rejuvenating action by maintaining proper body constitution and stoppage of dhatu kshaya. In this study total 100 patients of Janu Sandhigata Vata (Osteoarthritis of Knee Joint) were selected and randomly allocated into 4 groups, each of 25 patients. Glucosamine sulphate was given to patients of group 1 and different Rasayana were given to rest three groups, for total study period of three months. Patients were assessed at three follow-ups, each of one month intervals. Clinical effects were assessed and observations were analyzed statistically using SPSS. At the end of study significant improvement was observed in patients of all four groups but group 3 and 4 showed better results as compared to others.

**Keywords:** Ashwagandha, Dhatu kshaya, Guggulu, Rasayana, Sandhigata vata, Yastimadhu.

#### INTRODUCTION

Osteoarthritis is the second commonest musculoskeletal problem and Osteoarthritis of Knee Joint (Janu Sandhigata vata) is most prevalent joint disease in human beings. It is characterized by cartilage loss and inflammation of articular and periarticular structures. Among the elderly, Osteoarthritis of Knee Joint is the leading cause of chronic disability in developed countries. Because of Osteoarthritis, nearly 20%-30% of people in India are affected by some complaints of knee joint during their lives. Females are found more affected by this disorder in early decades of life but later as age progresses the prevalence in males also increases. Various treatments have been tried in different systems of medicine including the contemporary system of medicine but the statistical data of the cured is still observed lower than the expectations.

There is a strong need of such types of treatment modalities, which could retard cartilaginous degeneration and disease progression. In Ayurveda, Rasayana are considered as nutritional entities responsible for rejuvenation of wear out cells and removal of toxins and free radicals. Various researches have proved that Rasayana drugs act as adaptogenic, chondroprotective, analgesic, free radical

scavenging and immunomodulator. Rasayana could help in better management of Sandhigata Vata (Osteoarthritis).

#### AIM OF STUDY

To compare the efficacy of Glucosamine sulphate and some Rasayana in the management of Janu Sandhigata Vata (Osteoarthritis of knee joint)

#### MATERIALS AND METHODS

Total 100 patients of Janu Sandhigata Vata (Osteoarthritis of Knee Joint) were selected from Orthopedics O.P.D. and Swasthya Rakshana Clinic O.P.D. of S.S. Hospital, BHU, based on following inclusion and exclusion criteria:

##### Inclusion criteria:

- Patient of either gender belonging to age group 40 to 70.
- Diagnosis of Janu Sandhigata Vata (Osteoarthritis of knee joint) as per classical signs & symptoms based on Ayurvedic and Modern parameters.
- Visual Analog Score  $\geq 4$  for pain in one or both the knees.
- Patients taken NSAIDs for pain relief.

##### Exclusion criteria:

- Patients of Traumatic Arthritis.
- Women who are pregnant, lactating and not following adequate contraceptive measures.

- Patients having joint pain due to non-degenerative joint disease.
- Patient having history of intra-articular injection of Corticosteroid within a month of preceding study.
- Patient with evidence of severe unstable hepatic, renal, hemopoetic or cardiac disorders.
- Patients on antipyretics, analgesics, hypnotics, alcohol or any other drug interfering pain perception (Paracetamol was allowed as a rescue drug during study period.)

**Study Design:**

The patients were randomly allocated into 4 groups (25 patients in each group) and advised to take following drugs.

Group 1: Glucosamine sulphate

Group 2: Rasayana A

[Rasayana A= *Commiphora wightii* (Guggulu)]

Group 3: Rasayana A+B

[Rasayana B= *Glycyrrhiza glabra* (Yastimadhu)]

Group 4: Rasayana A+C

[Rasayana C= *Withania somnifera* (Ashwagandha)]

The crude forms of above 3 selected Rasayana were verified for quality in the Department of Dravyaguna and Rasashastra. The drugs were prepared in the Ayurvedic Pharmacy of Faculty of Ayurveda, BHU. Final drug was converted to granules and filled in hard gelatin capsules. Each capsule weighs about 750mg. Patients of Group 1 were advised to take 500mg tablet of Glucosamine sulphate once a day for continuous 3 months. In Group 2 patients were advised to take 1 capsule of pure Guggulu two times a day. Patients in Group 3 had taken 2 capsules of Rasayana A+B (Guggulu + Yastimadhu), two times a day for three months. Similarly in Group 4, patient had taken 2 capsules of Rasayana A+C (Guggulu + Ashwagandha), two times a day for three months.

**CLINICAL ASSESSMENT**

The clinical assessment was done on the basis of Subjective and Objective criteria evaluated by using SPSS16.0. Within the group comparison was carried out by Friedman test and between the groups comparison was done by Chi-square test.

**Subjective criteria:**

- Sandhi Shoola (Joint pain)

- Sandhishotha (Swelling)
- Sandhi Shabda (Crepitus)
- Active Pain Visual Analogue Score (VAS)

**Objective criteria:**

- Kellgren-Lawrence Scale based on X-Ray Knee joint

**Follow-up and Drop outs:**

This study was accompanied for a total period of three months and follow ups were conducted at every one month. Out of total 100 cases, 90 attended the hospital for total study period. Three follow up were carried out after every month. In Group 1, total 04 dropouts were recorded, two patients left out at second follow up and 02 patients at third follow up (total 21 cases). In Group 2, three dropouts were noted, two left at first follow up and one at third follow up (total 22 cases). Group 3 noted total 2 dropouts, one at first follow up and one at third follow up (total 23 cases). In group 4, total 24 cases completed the study. One patient left the study at first follow up.

**OBSERVATIONS AND RESULTS**

Out of 100 patients of Janu Sandhigata Vata (Osteoarthritis of Knee Joint), maximum patients were 50-70 years age group. Numbers of female patients were slightly high (54.0%) as compared to males (46.0%). Patients of Sthoola Sharira were considerably high (41.0%), as compared to Krisha patients (08.0%), showing direct relation of Sthoulaya (Obesity) with this disease. The highest percentage was of Vataja-Kaphaja Sharira Prakriti (39.0%) and Rajasika-Tamasika Manas Prakriti (47.0%).

A direct relation of this disease with physical activity was noticed, as patients complained more pain after doing strenuous physical work. Maximum patients were of Avara Vyayama Shakti (72.0%) and chronic painful condition may be a significant cause for the same. In this study group of 100 registered cases of Janu Sandhigata Vata, 74.0% of cases were having bilateral knee joint pain while only 26.0% reported unilateral knee joint pain. Maximum numbers of cases (61.0%) were suffering from pain for more than 3 years duration, indicating the chronicity of this disease.

**Table 1: Effect on intensity of Sandhishoola (Joint Pain) in Janu Sandhigata Vata (Osteoarthritis of Knee Joint)**

Group	Grade	Sandhishoola (Joint Pain) No. and % of Cases				Within Group Comparison (Friedman)
		BT	FU1	FU2	FU3	
Group I	0-No Pain	00 (00.0%)	00 (00.0%)	01 (04.0%)	01 (04.0%)	$\chi^2=51.911$ p<0.001
	1-Mild Pain	00 (00.0%)	04 (16.0%)	13 (52.0%)	15 (60.0%)	
	2-Moderate Pain	05 (20.0%)	15 (60.0%)	09 (36.0%)	05 (20.0%)	
	3-Mild pain with walking difficulty	19 (76.0%)	06 (24.0%)	00 (00.0%)	00 (00.0%)	
	4-Severe pain with walking difficulty	01 (04.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group II	0-No Pain	00 (00.0%)	01 (04.0%)	06 (24.0%)	05 (20.0%)	$\chi^2=53.918$ p<0.001
	1-Mild Pain	00 (00.0%)	04 (16.0%)	09 (36.0%)	13 (52.0%)	
	2-Moderate Pain	03 (12.0%)	11 (44.0%)	05 (20.0%)	02 (08.0%)	
	3-Mild pain with walking difficulty	16 (64.0%)	07 (28.0%)	03 (12.0%)	02 (08.0%)	
	4-Severe pain with walking difficulty	06 (24.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	

Group III	0-No Pain	00 (00.0%)	00 (00.0%)	04 (16.0%)	07 (28.0%)	$\chi^2=58.324$ p<0.001
	1-Mild Pain	00 (00.0%)	05 (20.0%)	08 (32.0%)	08 (32.0%)	
	2-Moderate Pain	05 (20.0%)	10 (40.0%)	09 (36.0%)	07 (28.0%)	
	3-Mild pain with walking difficulty	14 (56.0%)	08 (32.0%)	03 (12.0%)	01 (04.0%)	
	4-Severe pain with walking difficulty	06 (24.0%)	01(04.0%)	00(00.0%)	00(00.0%)	
Group IV	0-No Pain	00 (00.0%)	03 (12.0%)	08 (32.0%)	08 (32.0%)	$\chi^2=53.933$ p<0.001
	1-Mild Pain	01 (04.0%)	06 (24.0%)	06 (24.0%)	11 (44.0%)	
	2-Moderate Pain	06 (24.0%)	12 (48.0%)	08 (32.0%)	04 (16.0%)	
	3-Mild pain with walking difficulty	17 (68.0%)	03 (12.0%)	02 (08.0%)	01 (04.0%)	
	4-Severe pain with walking difficulty	01 (04.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Between the Group Comparison (Chi-square)		$\chi^2=11.93$ p=0.217	$\chi^2=12.93$ p=0.374	$\chi^2=12.97$ p=0.164	$\chi^2=17.20$ p=0.142	

Note- BT- Before Treatment, FU1- 1<sup>st</sup> follow up, FU2- 2<sup>nd</sup> follow up, and FU3- 3<sup>rd</sup> follow up

The numbers of cases having high intensity of Sandhishoola reduced at each follow up in all groups. Numbers of patients with severe difficulty on walking due to pain were found

maximum in Group 2 and 3 (6 cases each), these severe cases reduced at each follow up. Intra group comparison done by Friedman test, showed highly significant results in each group.

Table 2: Effect on intensity of Sandhishotha (Swelling) in Janu Sandhigata Vata (Osteoarthritis of Knee Joint)

Group	Grade	Sandhishotha (Swelling) No. and % of Cases				Within Group Comparison (Friedman)
		BT	FU1	FU2	FU3	
Group I	0-Absent	05 (20.0%)	08 (32.0%)	10 (40.0%)	09 (36.0%)	$\chi^2=29.233$ p<0.001
	1-Mild	06 (24.0%)	10 (40.0%)	10 (40.0%)	11 (44.0%)	
	2-Moderate	11 (44.0%)	06 (24.0%)	03 (12.0%)	01 (04.0%)	
	3-Severe	03 (12.0%)	01 (04.0%)	00 (00.0%)	00 (00.0%)	
Group II	0-Absent	05 (20.0%)	11 (44.0%)	14 (56.0%)	16 (64.0%)	$\chi^2=40.381$ p<0.001
	1-Mild	13 (52.0%)	10 (40.0%)	07 (28.0%)	05 (20.0%)	
	2-Moderate	05 (20.0%)	02 (08.0%)	02 (08.0%)	01 (04.0%)	
	3-Severe	02 (08.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group III	0-Absent	04 (16.0%)	08 (32.0%)	12 (48.0%)	14 (56.0%)	$\chi^2=36.171$ p<0.001
	1-Mild	14 (56.0%)	14 (56.0%)	09 (36.0%)	08 (32.0%)	
	2-Moderate	05 (20.0%)	02 (08.0%)	03 (12.0%)	01 (04.0%)	
	3-Severe	02 (08.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group IV	0-Absent	06 (24.0%)	14 (56.0%)	17 (68.0%)	19 (76.0%)	$\chi^2=26.069$ p<0.001
	1-Mild	16 (64.0%)	09 (36.0%)	06 (24.0%)	05 (20.0%)	
	2-Moderate	03 (12.0%)	01 (04.0%)	01 (04.0%)	00 (00.0%)	
	3-Severe	00 (00.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Between the Group Comparison (Chi-square)		$\chi^2=1.96$ p=0.581	$\chi^2=1.61$ p=0.658	$\chi^2=1.09$ p=0.780	$\chi^2=4.33$ p=0.228	

In all four groups the percentage of cases of Sandhishotha reduced at each follow up. The numbers of cases with severe score were absent even at second follow up and moderate grade cases reduced to one or absent at end of the study. The intra group comparison by Friedman test reveals statistically

highly significant results. Inter group comparison by Chi-square test was statistically non-significant at any follow up. The cases with absent Sandhishotha were highest (76.0%) in Group 4 at completion of the study followed in Group 2 (64.0%), Group 3 (56.0%) and least in Group 1 (36.0%).

Table 3: Effect on intensity of Sandhishabda (Crepitus) in Janu Sandhigata Vata (Osteoarthritis of Knee Joint)

Group	Grade	Sandhishabda (Crepitus) No. and % of Cases				Within Group Comparison (Friedman)
		BT	FU1	FU2	FU3	
Group I	0-No Crepitus	03(12.0%)	05(20.0%)	06(24.0%)	07(28.0%)	$\chi^2=14.556$ p<0.01
	1-Palpable Crepitus	12(48.0%)	09(36.0%)	10(40.0%)	09(36.0%)	
	2-Audible Crepitus	10(40.0%)	11(44.0%)	07(28.0%)	05(20.0%)	
Group	0-No Crepitus	03(12.0%)	05(20.0%)	07(28.0%)	10(40.0%)	$\chi^2=24.231$

II	1-Palpable Crepitus	16(64.0%)	12(48.0%)	11(44.0%)	10(40.0%)	p<0.01
	2-Audible Crepitus	06(24.0%)	06(24.0%)	05(20.0%)	02(08.0%)	
Group III	0-No Crepitus	04(16.0%)	06(24.0%)	06(24.0%)	08(32.0%)	$\chi^2=18.444$ p<0.001
	1-Palpable Crepitus	15(60.0%)	16(64.0%)	16(64.0%)	15(60.0%)	
	2-Audible Crepitus	06(24.0%)	02(08.0%)	02(08.0%)	00(00.0%)	
Group IV	0-No Crepitus	02(08.0%)	06(24.0%)	09(36.0%)	11(44.0%)	$\chi^2=12.286$ p<0.01
	1-Palpable Crepitus	20(80.0%)	18(72.0%)	14(56.0%)	10(40.0%)	
	2-Audible Crepitus	03(12.0%)	00(00.0%)	01(04.0%)	03(12.0%)	
Between the Group Comparison (Chi-Square)		$\chi^2=6.71$	$\chi^2=18.17$	$\chi^2=8.66$	$\chi^2=8.20$	
		p=.349	p=.006	p=193	p=.224	

Data collected from 100 patients of Sandhigata Vata revealed that the complaint of Sandhishabda (Crepitus) reduced considerably at each follow up. Within the group comparison by Friedman test shows statistically highly significant results.

The significance in Group 3 was much higher (p<0.001) as compared to other groups (p<0.01). The Chi-square test was performed to assess the inter group comparison but it does not revealed any statistically significant results.

**Table 4: Effect on Visual Analog Score in 100 patients of Janu Sandhigata Vata (Osteoarthritis of Knee Joint)**

Group	Grade	Visual Analog Score No. and % of Cases				Within Group Comparison (Friedman)
		BT	FU1	FU2	FU3	
Group I	1-2 Absent	00 (00.0%)	00 (00.0%)	00 (00.0%)	12 (48.0%)	$\chi^2=57.99$ p<.001
	3-4 Mild	00 (00.0%)	02 (08.0%)	14 (56.0%)	07 (28.0%)	
	5-6 Moderate	04 (16.0%)	18 (72.0%)	08 (32.0%)	02 (08.0%)	
	7-8 Severe	20 (80.0%)	05 (20.0%)	01 (04.0%)	00 (00.0%)	
	9-10 Very Severe	01 (04.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group II	1-2 Absent	00 (00.0%)	00 (00.0%)	00 (00.0%)	11 (44.0%)	$\chi^2=63.23$ p<.001
	3-4 Mild	00 (00.0%)	01 (04.0%)	13 (52.0%)	09 (36.0%)	
	5-6 Moderate	03 (12.0%)	18 (72.0%)	09 (36.0%)	02 (08.0%)	
	7-8 Severe	18 (72.0%)	04 (16.0%)	01 (04.0%)	00 (00.0%)	
	9-10 Very Severe	04 (16.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group III	1-2 Absent	00 (00.0%)	00 (00.0%)	02 (08.0%)	12 (48.0%)	$\chi^2=60.56$ p<.001
	3-4 Mild	00 (00.0%)	05 (20.0%)	06 (24.0%)	05 (20.0%)	
	5-6 Moderate	07 (28.0%)	12 (48.0%)	12 (48.0%)	04 (16.0%)	
	7-8 Severe	14 (56.0%)	07 (28.0%)	04 (16.0%)	02 (08.0%)	
	9-10 Very Severe	04 (16.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group IV	1-2 Absent	00 (00.0%)	00 (00.0%)	00 (00.0%)	14 (56.0%)	$\chi^2=68.09$ p<.001
	3-4 Mild	00 (00.0%)	02 (08.0%)	14 (56.0%)	07 (28.0%)	
	5-6 Moderate	04 (16.0%)	19 (76.0%)	09 (36.0%)	02 (08.0%)	
	7-8 Severe	20 (80.0%)	03 (12.0%)	01 (04.0%)	01 (04.0%)	
	9-10 Very Severe	01 (04.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Between the Group Comparison (Chi-square)		$\chi^2=2.44$ p=0.468	$\chi^2=2.21$ p=0.529	$\chi^2=4.65$ p=0.199	$\chi^2=5.11$ p=0.164	

In this study we observed considerable improvement in Visual Analog Scores of patients at each follow up. Maximum numbers of patients were under the grade of absent to mild pain at final follow up of clinical trial period. Intra group

comparison by Friedman test also revealed statistically highly significant results. The inter group comparison by Chi-square test was non-significant in all four groups.

**Table 5: Effect on Kellgren Lawrence grading in 100 patients of Janu Sandhigata Vata (Osteoarthritis of Knee Joint).**

Group	Grade	K.L. Scale No. and % of Cases				Within Group Comparison (Friedman)
		BT	FU1	FU2	FU3	
Group I	Grade I	00 (00.0%)	01 (04.0%)	02 (08.0%)	01 (04.0%)	$\chi^2=4.765$ p=0.190
	Grade II	21 (84.0%)	19 (68.0%)	18 (72.0%)	17 (68.0%)	
	Grade III	04 (16.0%)	05 (20.0%)	03 (12.0%)	03 (12.0%)	
	Grade IV	00 (00.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
Group II	Grade I	03 (12.0%)	02 (08.0%)	02 (08.0%)	02 (08.0%)	$\chi^2=3.00$ p=0.392
	Grade II	15 (60.0%)	15 (60.0%)	15 (60.0%)	14 (56.0%)	
	Grade III	07 (28.0%)	06 (24.0%)	06 (24.0%)	06 (24.0%)	

	<b>Grade IV</b>	00 (00.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
<b>Group III</b>	<b>Grade I</b>	04 (16.0%)	03 (12.0%)	02 (08.0%)	02 (08.0%)	$\chi^2=2.00$ p=0.572
	<b>Grade II</b>	15 (60.0%)	17 (68.0%)	18 (72.0%)	17 (68.0%)	
	<b>Grade III</b>	06 (24.0%)	04 (16.0%)	04 (16.0%)	04 (16.0%)	
	<b>Grade IV</b>	00 (00.0%)	00 (00.0%)	00 (00.0%)	00 (00.0%)	
<b>Group IV</b>	<b>Grade I</b>	05 (20.0%)	05 (20.0%)	05 (20.0%)	05 (20.0%)	$\chi^2=7.20$ p=0.06
	<b>Grade II</b>	14 (56.0%)	15 (60.0%)	16 (64.0%)	16 (64.0%)	
	<b>Grade III</b>	06 (24.0%)	04 (16.0%)	03 (12.0%)	03 (12.0%)	
<b>Between the Group Comparison (Chi-square)</b>		$\chi^2=1.07$ p=0.784	$\chi^2=0.87$ p=0.833	$\chi^2=1.95$ p=0.584	$\chi^2=2.20$ p=0.532	

The improvement in Kellgren Lawrence grading was found non-significant in all the four trial groups when compared by using Friedman test. Similarly between the groups comparison by chi-square test also yielded non-significant results. Maximum patients were in Grade 2 and 3 at beginning of the study and they showed nil or very small improvement in their Kellgren Lawrence grading scores at the end of the trial period (3 months only).

## DISCUSSION

Guggulu (*Commiphora wightii*) is the common drug for all the three trial groups. The other two drugs were Ashwagandha (*Withania somnifera*) and Yastimadhu (*Glycyrrhiza glabra*). All these three drugs act as Rasayana in their action. Guggulu is one of the well-established Vedanasthapana dravyas in Ayurveda. All the senses of our body are governed by the Vata dosha and perception of pain is also a function of Vata. Guggulu by virtue of its Ushna Veerya help in maintaining the normalcy of vitiated Vata dosha. Guggulu possesses Teekshna and Sookshma guna that helps it to penetrate even into minute channels of body. Guggulu contains active constituents E-Guggulsterone and Z-Guggulsterone. In vitro E-Guggulsterone isomerizes to Z-Guggulsterone. Both E and Z Guggulsterone shows inhibition of carrageenan induced paw edema in rats<sup>1</sup>. Gujral et al (1960) found the anti-arthritis and anti-inflammatory activity of gum Guggulu in their study<sup>2</sup>. A study conducted by Haruyo Ichikawa and Bharat B. Aggarwal reported that Guggulsterone is Receptor Activator of Nuclear factor  $\kappa$ B Ligand (RANKL), which is a member of TNF family. In this study they found that Guggulsterone inhibited the RANKL induced Osteoclastogenesis<sup>3</sup>.

Yastimadhu, a well-known Rasayana drug has been mentioned in Sandhaniya Mahakashaya. Sandhaniya dravyas helps in reunion, repair and nourishment of affected joint. In Sandhigata Vata degeneration is a major cause for chronicity of the disease. Yastimadhu along with Guggulu acts as repair agent and retards the process of degeneration. Due to Guru, Snigdha guna and Madhura Vipaka it pacifies the vitiated Vata and slow down the degeneration process. Madhuyasti is also known for its anti ageing properties. Azadeh Mohammadirad et al. (2003) found that Glycyrrhiza glabra has anti ageing and antioxidant effects<sup>4</sup>.

Ashwagandha has been proved as an important Rasayana drug in Ayurvedic texts. It is one of the most extensively studied adaptogenic herb. Withanolides are the main and most important bioactive substances in the roots of Ashwagandha, which are responsible for adaptogenic, anti-inflammatory

antioxidant, antitumor, anti ageing and many other properties. Ashwagandha has antipyretic, analgesic and anti-arthritis properties<sup>5</sup>. Venil N Sumantran et. al (2007) studied the chondroprotective potential of root extract of Ashwagandha in patients of Osteoarthritis and they found that these extracts yielded a statistically significant, short-term chondroprotective effect on damaged human osteoarthritic cartilage matrix in 50% of the patients and also caused a significant and reproducible inhibition of the gelatinase activity of collagenase type 2 enzyme in vitro<sup>6</sup>.

In case of Sandhishoola and Sandhishotha we found statistically significant improvement in all the four trial groups but in Group 4 (taken Guggulu and Ashwagandha) clinically more effective results were obtained. These results shows that although Glucosamine sulphate produced a quick relief in Sandhishoola as compared to Rasayana drugs but a sustained and higher degree of improvement was observed in Group 4 cases. Out of 4 study groups, in Group 3 (taken Guggulu and Yastimadhu) we noticed the highest improvement in Crepitus scores, as the numbers of cases with audible crepitus were absent at final follow up of the study.

Intra group comparison of Visual Analog Scores was statistically significant in all trial groups but Group 4 showed a comparatively better improvement. At final follow up the number of patients with absent pain scores were found higher in Group 4 (56.0%), followed by 48.0% in both Group 3 and 1 and 44.0% in Group 2. These values indicate that the Rasayana given to the patients of Group 4 responded better as compared to other Rasayana.

The results of Kellgren Lawrence scale scores were statistically non-significant in all the four trial groups. This may be due to the fact that most of the patients in our study were having Grade 2 or Grade 3 deformity in their knee joints and Grade 2 and 3 indicate the confirm Osteophytes with definite narrowing of joint space. Osteoarthritis is a degenerative disease and joint space narrowing indicates the degree of degeneration. Kellgren Lawrence scale indicates the progression of disease on basis of radiological findings. Our study showed a significant improvement in clinical symptoms of disease but data collected on the basis of radiological features revealed non-significant changes. Very short duration of the study period may be the reason for the same.

## CONCLUSION

Osteoarthritis (Sandhigata Vata) is a degenerative and progressive disease mainly affects the joint cartilage. Knee and hip are the commonest sites of this disease and prevalence

increases with age. Rasayana drugs used in this study could act as chondroprotective, anti-inflammatory, analgesic, free radical scavenging and immunomodulator. The overall results in cases taken Glucosamine sulfate were also statistically significant but they are clinically less significant as compared to other three study groups. This study proves that selected Rasayana have positive effect on the cases of Janu Sandhigata vata (Osteoarthritis of Knee Joint), and these Rasayana should be used successfully for its better management without any side effects.

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