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A Comparative study on effect of Sujok therapy and Physical Therapy on Knee Osteoarthritis patients of Ahmedabad city in India

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ABSTRACT

Physical therapy and Sujok have been proved to be safe and effective in osteoarthritis treatment as two major non operative methods. Only a little study has been focused on the functions of these methods comparing the effectiveness of su-jok, su joke + physical therapy and physical therapy on knee osteoarthritis patients. A random sample of 90 adult patients of knee OA aged between 18 to 60 years, (30 from each treatment) Sujok, Sujok + physical therapy and Physical therapy were taken for the comparison of effectiveness of all these treatments on knee osteoarthritis from the Ahmedabad city of India. Data was collected in the period of September 2022 to November 2022. When using an ANOVA with repeated measures with a Greenhouse-Geisser correction, the mean scores for pains after physical therapy sessions were statistically significantly different ($F(3.119, 90.460) = 38.405$, $p < 0.0005$). Post hoc analysis with a Bonferroni adjustment revealed that pain was statistically significantly decreased from after day 3 of continuous physical therapy treatment. While in Sujok and Sujok + Physical therapy the pain decreased significantly after 1st day but increased drastically after day 6.

Keywords: Sujok, Physical therapy, Acupressure, Repeated Measure ANOVA, Bonferroni

I. INTRODUCTION

Sujok, part of Onnuri Medicine, is a therapeutic system that consists of various techniques to prevent, treat, and restore health without the use of drugs. Our hands ("su") and feet ("jok") in Korean represent our entire body in miniature. In fact, they represent small but faithful reflexes throughout the body (for example, the thumb and big toe represent the head). Like controlling a TV with a remote control, one can use their limbs to affect your entire body and cure disease. By

understanding the exact similarities between different parts of the body and limbs, the right Sujok treatment can affect any area or problem. The body`s meridian system that we use to perform metaphysical energy manipulation therapies is also reflected in our limbs. Learning the principles of Hand and Foot Therapy is a great tool for personal and family health care. In fact, our vision is to enable all home healers to take care of themselves and their families. [1]

Stimulating the healing points will usually give immediate results. For example, how can you dry a runny nose? Determine the sensitive point on the last phalanx of the thumb corresponding to the sinuses, apply a black pepper with a bandage and massage as desired. PMS is also pretty easy to reduce: Hold the pain point between the middle and ring fingers of the hand, which represents the female genitalia, and massage until the pain is gone (usually a minute or two is enough to get rid of the severe condition and cramp). Backache? Work on the back of the hand. Stimulate sensitive point's right above the knuckles; you can also apply black pepper. [1]

As a type of degenerative joint disease, osteoarthritis (OA) is characterized by the breakdown of cartilage, which can occur in all joints, especially those that are loaded. The knee joint is considered the most frequently complained site in the clinic. There are currently two possible treatments for osteoarthritis: surgical and non-surgical therapy. However, surgery has been reported to be appropriate for late-stage patients, and nonsurgical treatment is mainly reserved for early- or mid-stage patients. As the two main non-surgical methods, physical therapy and acupuncture have been shown to be safe and effective in the treatment of osteoarthritis. Studies have reported that physical therapy can be effective in reducing inflammation and pain [2], and acupuncture can markedly improve symptoms and motor function of the knee joint in patients knee osteoarthritis (KOA) [3, 4].

II. MATERIALS AND METHODOLOGY

A pilot study was conducted using convenience sampling at physical therapy clinics of Ahmedabad city in Gujarat state of India; in 90 adult patients with knee osteoarthritis aged 18 to 60 years. The data was collected from September 2022 to November 2022.

Data is collected for pain and its intensity. The patients were then divided into 3 groups - Patients treated with physical therapy and Sujok therapy, Patients treated with Sujok therapy only, Patients treated with physical therapy only. In Sujok therapy, the patient will be diagnosed by probing and then finding a spot within reach. Using the Su Jok theory, the first thing to do is to find the corresponding areas of the knee on the hand, and then stimulate these points. The most painful spots are found on one or more areas of the middle or ring finger, then massage these areas. The next step is to massage the finger areas (knuckles) that correspond to your knees using a Sujok ring or a massage ring. The next step is to heat these areas with Moxa. After that, we will apply beads to the area corresponding to the knee, on the left or right hand. The patient will be examined by VAS (visual analogue scale). The Image Analogue Scale (VAS) is a subjective and validated measure of acute and chronic pain. Scores are recorded using handwritten markers on a 10-cm line representing the continuum between "no pain" and "more severe pain". To test the effects of Sujok therapy. Physical therapy treatment will include the following: - 1. Quadriceps adjustment, 2. Quadriceps strengthening, 3. Hamstring stretch.

Data was tabulated in Microsoft Excel and analyzed using IBM Corp. Released 2011. IBM

SPSS Statistics for Windows, Version 20.0. Armonk, New York and Microsoft Excel 2007.

III.Results

Table I: Descriptive Statistics

		Frequency	Percentage
Gender	**Female**	44	48.9%
	Male	46	51.1%
Treatment Given	**Physical therapy**	30	33.3%
	Sujok + Physical therapy	30	33.3%
	Sujok Therapy	30	33.3%

This study comprised of 90 respondents divided equally among all the three treatments. From which 46 were males and 44 were females. The bifurcation can be found from Table I.

From Table II we are able to discover the F value for the "**days**" factor, its associated significance level and effect size ("**Partial Eta Squared**"). As our data violated the assumption of sphericity, we look at the values in the "**Greenhouse-Geisser**" row. When using an ANOVA with repeated measures with a Greenhouse-Geisser correction, the mean scores for pains after physical therapy sessions were statistically significantly different ($F(3.119, 90.460) = 38.405$, $p < 0.0005$).

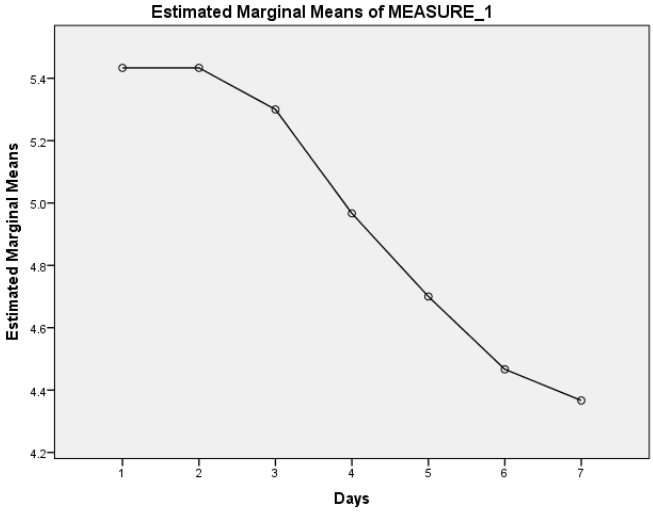
Table II: Repeated measure ANOVA for testing effectiveness of physical therapy sessions on Knee OA patients after 7 days of daily treatment

Tests of Within-Subjects Effects							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Days	Sphericity Assumed	36.790	6	6.132	38.4	0.0	0.570
	Greenhouse-Geisser	36.790	3.119	11.79	38.4	0.0	0.570
	Huynh-Feldt	36.790	3.539	10.39	38.4	0.0	0.570
	Lower-bound	36.790	1.000	36.79	38.4	0.0	0.570
Error (Days)	Sphericity Assumed	27.781	174	0.160			
	Greenhouse-Geisser	27.781	90.46	0.307			
	Huynh-Feldt	27.781	102.61	0.271			
	Lower-bound	27.781	29.00	0.958			

Table III: Pairwise comparison table for Physical therapy treatment on Knee OA patients

Pairwise Comparisons						
Measure: MEASURE_1						
(I) Days	(J) Days	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	0.000	0.048	1.000	-0.160	0.160
	3	0.133	0.104	1.000	-0.214	0.481
	4	0.467*	0.115	0.007	0.084	0.849

	5	0.733*	0.126	0.000	0.313	1.154
	6	0.967*	0.122	0.000	0.560	1.373
	7	1.067*	0.135	0.000	0.617	1.516
2	1	0.000	0.048	1.000	-0.160	0.160
	3	0.133	0.079	1.000	-0.131	0.397
	4	0.467*	0.104	0.002	0.119	0.814
	5	0.733*	0.117	0.000	0.345	1.122
	6	0.967*	0.112	0.000	0.593	1.340
	7	1.067*	0.126	0.000	0.646	1.487
3	1	-0.133	0.104	1.000	-0.481	0.214
	2	-0.133	0.079	1.000	-0.397	0.131
	4	0.333*	0.088	0.014	0.042	0.625
	5	0.600*	0.103	0.000	0.258	0.942
	6	0.833*	0.108	0.000	0.473	1.193
	7	0.933*	0.117	0.000	0.545	1.322
4	1	-0.467*	0.115	0.007	-0.849	-0.084
	2	-0.467*	0.104	0.002	-0.814	-0.119
	3	-0.333*	0.088	0.014	-0.625	-0.042
	5	0.267	0.082	0.062	-0.007	0.540
	6	0.500*	0.093	0.000	0.191	0.809
	7	0.600*	0.103	0.000	0.258	0.942
5	1	-0.733*	0.126	0.000	-1.154	-0.313
	2	-0.733*	0.117	0.000	-1.122	-0.345
	3	-0.600*	0.103	0.000	-0.942	-0.258
	4	-0.267	0.082	0.062	-0.540	0.007
	6	0.233	0.079	0.124	-0.028	0.495
	7	0.333*	0.100	0.049	0.001	0.666
6	1	-0.967*	0.122	0.000	-1.373	-0.560
	2	-0.967*	0.112	0.000	-1.340	-0.593
	3	-0.833*	0.108	0.000	-1.193	-0.473
	4	-0.500*	0.093	0.000	-0.809	-0.191
	5	-0.233	0.079	0.124	-0.495	0.028
	7	0.100	0.056	1.000	-0.085	0.285
7	1	-1.067*	0.135	0.000	-1.516	-0.617
	2	-1.067*	0.126	0.000	-1.487	-0.646
	3	-0.933*	0.117	0.000	-1.322	-0.545
	4	-0.600*	0.103	0.000	-0.942	-0.258
	5	-0.333*	0.100	0.049	-0.666	-0.001
	6	-0.100	0.056	1.000	-0.285	0.085
Based on estimated marginal means						
*. The mean difference is significant at the .05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						



Conclusion1: A repeated measures ANOVA with a Greenhouse-Geisser correction determined that the mean scores for pains after physical therapy sessions were statistically significantly different ($F(3.119, 90.460) = 38.405$, $p < 0.0005$).

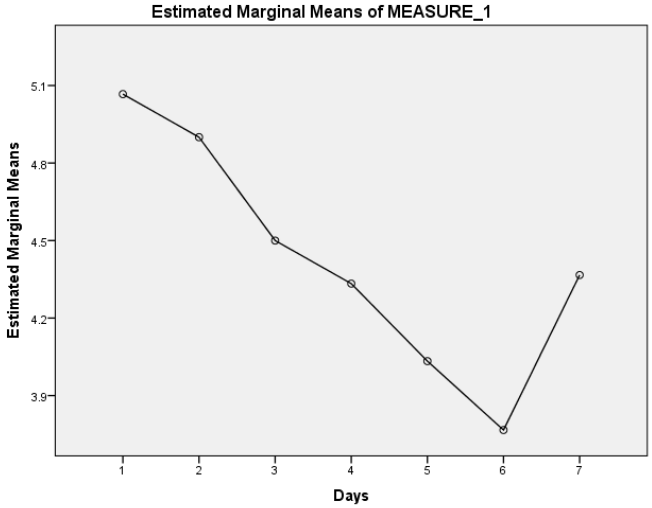
Post hoc analysis with a Bonferroni adjustment revealed that pain was statistically significantly decreased after day 3 of continuous physical therapy treatment.

Table IV: Repeated measure ANOVA for testing effectiveness of Sujok sessions on Knee OA patients after 7 days of daily treatment

Tests of Within-Subjects Effects							
Measure: MEASURE_1							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Days	Sphericity Assumed	59.714	6	9.952	23.492	0.0	0.448
	Greenhouse-Geisser	59.714	2.194	27.218	23.492	0.0	0.448
	Huynh-Feldt	59.714	2.381	25.082	23.492	0.0	0.448
	Lower-bound	59.714	1.000	59.714	23.492	0.0	0.448
Error (Days)	Sphericity Assumed	73.714	174	0.424			
	Greenhouse-Geisser	73.714	63.62	1.159			
	Huynh-Feldt	73.714	69.04	1.068			
	Lower-bound	73.714	29.00	2.542			

The 7 days Sujok treatment had a statistically significant effect on pain levels of knee OA, $F(6,174) = 23.492$, $p = 0.000$.

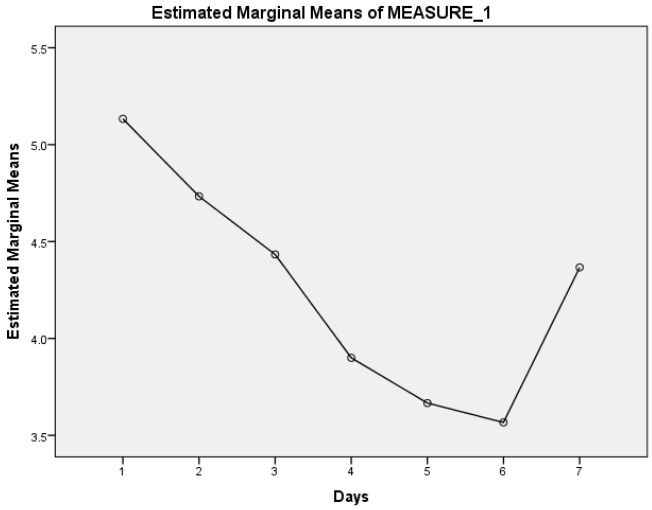
From this table we are able to discover the *F* value for the "**days**" factor, its associated significance level and effect size ("**Partial Eta Squared**"). As our data violated the assumption of sphericity, we look at the values in the "**Greenhouse-Geisser**" row. When using an ANOVA with repeated measures with a Greenhouse-Geisser correction, the mean scores for pains after Sujok sessions were statistically significantly different ($F(2.194, 63.624) = 23.492$, $p < 0.0005$).



Conclusion3: A repeated measures ANOVA with a Greenhouse-Geisser correction determined that the mean scores for pains after Sujok + physical therapy sessions were statistically significantly different ($F(2.849, 82.630) = 13.073$, $p < 0.0005$).

Pairwise Comparisons						
Measure: MEASURE_1						
(I) Days	(J) Days	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	0.400	0.123	0.062	-0.010	0.810
	3	0.700*	0.119	0.000	0.304	1.096
	4	1.233*	0.149	0.000	0.737	1.730
	5	1.467*	0.157	0.000	0.944	1.990
	6	1.567*	0.149	0.000	1.070	2.063
	7	0.767	0.278	0.211	-0.160	1.693
2	1	-0.400	0.123	0.062	-0.810	0.010
	3	0.300*	0.085	0.030	0.017	0.583
	4	0.833*	0.136	0.000	0.380	1.287
	5	1.067*	0.143	0.000	0.590	1.544
	6	1.167*	0.145	0.000	0.686	1.648
	7	0.367	0.286	1.000	-.584	1.317
3	1	-0.700*	0.119	0.000	-1.096	-0.304
	2	-0.300*	0.085	0.030	-0.583	-0.017
	4	0.533*	0.124	0.004	0.119	0.948
	5	0.767*	0.114	0.000	0.386	1.147
	6	0.867*	0.104	0.000	0.519	1.214
	7	0.067	0.262	1.000	-0.807	0.940
4	1	-1.233*	0.149	0.000	-1.730	-0.737
	2	-0.833*	0.136	0.000	-1.287	-0.380
	3	-0.533*	0.124	0.004	-0.948	-0.119
	5	0.233	0.079	0.124	-0.028	0.495
	6	0.333*	0.088	0.014	0.042	0.625
	7	-0.467	0.234	1.000	-1.244	0.311

5	1	-1.467*	0.157	0.000	-1.990	-0.944
	2	-1.067*	0.143	0.000	-1.544	-0.590
	3	-0.767*	0.114	0.000	-1.147	-0.386
	4	-0.233	0.079	0.124	-0.495	0.028
	6	0.100	0.056	1.000	-0.085	0.285
	7	-0.700*	0.204	0.039	-1.380	-0.020
6	1	-1.567*	0.149	0.000	-2.063	-1.070
	2	-1.167*	0.145	0.000	-1.648	-0.686
	3	-0.867*	0.104	0.000	-1.214	-0.519
	4	-0.333*	0.088	0.014	-0.625	-0.042
	5	-0.100	0.056	1.000	-0.285	0.085
	7	-0.800*	0.217	0.019	-1.521	-0.079
7	1	-0.767	0.278	0.211	-1.693	0.160
	2	-0.367	0.286	1.000	-1.317	0.584
	3	-0.067	0.262	1.000	-0.940	0.807
	4	0.467	0.234	1.000	-0.311	1.244
	5	0.700*	0.204	0.039	0.020	1.380
	6	0.800*	0.217	0.019	0.079	1.521
Based on estimated marginal means						
*. The mean difference is significant at the .05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						



Conclusion2: A repeated measures ANOVA with a Greenhouse-Geisser correction determined that the mean scores for pains after Sujok sessions were statistically significantly different ($F(2.194, 63.624) = 23.492$, $p < 0.0005$).

Post hoc analysis with a Bonferroni adjustment revealed that pain was statistically significantly decreased after day 1 of continuous Sujok treatment but drastically elevated after day7.

Table VI: Repeated measure ANOVA for testing effectiveness of Sujok + Physical therapy sessions on Knee OA patients after 7 days of daily treatment

Tests of Within-Subjects Effects							
Measure: MEASURE_1							
Source		Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Days	Sphericity Assumed	37.248	6	6.208	14.074	0.000	0.327
	Greenhouse-Geisser	37.248	2.849	13.073	14.074	0.000	0.327
	Huynh-Feldt	37.248	3.192	11.668	14.074	0.000	0.327
	Lower-bound	37.248	1.000	37.248	14.074	0.001	0.327
Error (Days)	Sphericity Assumed	76.752	174	0.441			
	Greenhouse-Geisser	76.752	82.630	0.929			
	Huynh-Feldt	76.752	92.575	0.829			
	Lower-bound	76.752	29.000	2.647			

From this table we are able to discover the *F* value for the "**days**" factor, its associated significance level and effect size ("**Partial Eta Squared**"). As our data violated the assumption of sphericity , we look at the values in the "**Greenhouse-Geisser**" row. When using an ANOVA with repeated measures with a Greenhouse-Geisser correction, the mean scores for pains after Sujok + physical therapy sessions were statistically significantly different ($F(2.849, 82.630) = 13.073$, $p < 0.0005$).

Table VII: Pairwise comparison table for Sujok + Physical therapy treatment on Knee OA patients

Pairwise Comparisons						
Measure: MEASURE_1						
(I) Days	(J) Days	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
1	2	0.167	0.108	1.000	-0.193	0.527
	3	0.567*	0.124	0.002	0.154	0.979
	4	0.733*	0.166	0.003	0.182	1.285
	5	1.033*	0.162	0.000	0.492	1.574
	6	1.300*	0.180	0.000	0.700	1.900
	7	0.700	0.236	0.124	-0.084	1.484
2	1	-0.167	0.108	1.000	-0.527	0.193
	3	0.400*	0.103	0.011	0.058	0.742
	4	0.567*	0.124	0.002	0.154	0.979
	5	0.867*	0.115	0.000	0.484	1.249
	6	1.133*	0.150	0.000	0.635	1.631

	7	0.533	0.234	0.628	-0.244	1.311
3	1	-0.567*	0.124	0.002	-0.979	-0.154
	2	-0.400*	0.103	0.011	-0.742	-0.058
	4	0.167	0.118	1.000	-0.227	0.560
	5	0.467*	0.124	0.016	0.052	0.881
	6	0.733*	0.126	0.000	0.313	1.154
	7	0.133	0.248	1.000	-0.692	0.959
4	1	-0.733*	0.166	0.003	-1.285	-0.182
	2	-0.567*	0.124	0.002	-0.979	-0.154
	3	-0.167	0.118	1.000	-0.560	0.227
	5	0.300	0.109	0.210	-0.062	0.662
	6	0.567*	0.104	0.000	0.221	0.912
	7	-0.033	0.256	1.000	-0.885	0.819
5	1	-1.033*	0.162	0.000	-1.574	-0.492
	2	-0.867*	0.115	0.000	-1.249	-0.484
	3	-0.467*	0.124	0.016	-0.881	-0.052
	4	-0.300	0.109	0.210	-0.662	0.062
	6	0.267	0.117	0.628	-0.122	0.655
	7	-0.333	0.255	1.000	-1.183	0.516
6	1	-1.300*	0.180	0.000	-1.900	-0.700
	2	-1.133*	0.150	0.000	-1.631	-0.635
	3	-0.733*	0.126	0.000	-1.154	-0.313
	4	-0.567*	0.104	0.000	-0.912	-0.221
	5	-0.267	0.117	0.628	-0.655	0.122
	7	-0.600	0.243	0.409	-1.408	0.208
7	1	-0.700	0.236	0.124	-1.484	0.084
	2	-0.533	0.234	0.628	-1.311	0.244
	3	-0.133	0.248	1.000	-0.959	0.692
	4	0.033	0.256	1.000	-0.819	0.885
	5	0.333	0.255	1.000	-0.516	1.183
	6	0.600	0.243	0.409	-0.208	1.408
Based on estimated marginal means						
*. The mean difference is significant at the .05 level.						
b. Adjustment for multiple comparisons: Bonferroni.						

Post hoc analysis with a Bonferroni adjustment revealed that pain was statistically significantly decreased after day 1 of continuous Sujok + Physical therapy treatment but drastically elevated after day 7.

In two pooled studies (5), (6), treatment with a physical therapy modality combined with stretching exercises reduced VAS pain scores statistically better than treatment with a physical therapy modality alone. (WMD 0.56; 95% CI 0.20 to 0.92; $I^2 = 0\%$; $P < 0.05$; n = 102 pooled sample size). Similar results were obtained from studies using the KOOS pain scale (7),

(5). (WMD 7.52; 95% CI 4.05 to 10.98; I^2 = 0%; P < 0.05; with pooled sample size of n = 76).

Fitzgerald et al. (8) Evaluating these techniques individually found no significant evidence that these exercises improved pain and muscle strength in knee OA patient. This finding does not confirm the study by Diracoglu et al. (9) compared kinesthetic and balance exercises, or strengthening exercises alone, in a woman with knee osteoarthritis and found comparably positive results in terms of muscle strength, quality of life, and physical function scales of her WOMAC questionnaire.

Lim Chen, HL. According to et al (2022), functional status was assessed primarily using her WOMAC scale and significant improvement with IFC implementation was observed at short-term assessment but not at long-term follow-up. We also found that gait test (short-term and long-term) and stiffness score (short-term) results did not favor the use of IFC over control treatment. The WOMAC scale assesses activities of daily living, functional mobility, gait, general health status, and quality of life in patients with knee osteoarthritis (11). It consists of 24 questions divided into pain, physical function and stiffness subscales. Outlier data from one study were removed as part of sensitivity testing because high heterogeneity was observed due to poor blinding of study participants and small sample size (12). The importance of the results in suggesting that the results are reliable. Although many studies were found dealing with the treatment of knee pain, there are no known studies related to Sujok therapy in patients with knee osteoarthritis.

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