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The Effect of Combining Phonophoresis and Mobilization with Movement in the Management of Knee Osteoarthritis: A Clinical Trial with Randomization

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ABSTRACT:

Background:

Knee osteoarthritis is a major musculoskeletal problem especially in senior population. It is mechanical dysfunction and reflects degenerative changes. Clinically it manifests as pain and disability in performing activities of daily livings.

Objective:

The aims was to establish effect of combining Phonophoresis with Mobilization with Movement in patients with knee osteoarthritis for improvement in pain & stiffness level, functional abilities

Methodology:

This was Randomized Clinical Trial. A sample size of 75 participants with Osteoarthritis of knee was randomized into 3 groups of 25 participants. Group-A was treated With the Phonophoresis (Ultrasound with ketoprofen gel) alone and Group-B with Mobilization with movement alone while Group C with combination of Phonophresis and Mobilization with movement. All the three groups were treated 6times over 3 weeks. Data was collected before first treatment as baseline, after 6th treatment at 3 week period and at 6th week as follow-up. The outcomes measure used were the NRS-101 pain scale, Short-Form McGill Pain Questionnairefor pain assessment, goniometry for measurement of range and for assessing functional level the Western Ontario and McMaster Universities Osteoarthritis Index was used.

Results:

In this study, statistically significant intra-group changes ($p<0.05$) were noted for mobilization with movement (Group B) and particularly mobilization with movement and Phonophoresis (Group C) in all outcome measures.

Conclusion:

This randomized clinical trial contributes to the current evidence available to practitioners about the potential utility of mobilization with movement, particularly mobilization with movement in combination with Phonophoresis in the symptomatic treatment of knee osteoarthritis.

Keywords:

Knee Osteoarthritis, Mobilization with Movement, Phonophoresis

INTRODUCTION:

Osteoarthritis (OA) is a degenerative joint disease and the most prevalent form of arthritis among the elder age population. Its clinical presentation may be unilateral or bilateral involvement while the medial side of the knee is the commonly affected site in the body.[1' These problems manifests as decrease in activity of daily living (ADLs) with considerable pain and disability [2 The frequently associated risk factors with KOA are genetic predisposition, increase in age, previous injury obesity, overuse, incongruent/unequal joint spacing, female gender and decreased bone density.'s'

The previous researches support the notion of hypo mobility (decreased joint play, end feel spring, and range of motion), as a key element of joint dysfunction in early to moderate KOA presentation."'

The non invasive intervention for osteoarthritis of the knee has involved use of NSAIDs, Manipulation/Mobilization and therapeutic

exercise along with patient education and weight control strategies. The literature supports that rehabilitation protocols comprising of exercise therapy alone, or combination of manual therapy with exercise therapy may provide the same and superior levels of relief over NSAIDs, to support limited use of NSAIDs by physiotherapists.'[8,] Efficacy of ketoprofen gel for topical therapy over Oral NSAIDs[] Fastum gel (ketoprofen 2.5%, ethyl alcohol, carbomer, diethanolamine, essence of lavender, methyl parahydroxybenzoate, and propyl para-hydroxybenzoate) has been proven previously, effects can be enhanced by phonophorosis.['-[1]"

Mobilization with Movement, as devised by Mulligan is the most advanced and functional approach of manual therapy, a holistically designed protocol for the Mobilization of joints. The emphasis of MWM is to regain the functional capabilities of patients with the principle of no pain under the idea of correcting the positional fault during application of MWM.'[1]"

Effects of phonophorosis and MWM have been proven separately, but there is need to test these in combination which would contribute to effective management of knee osteoarthritis.

METHODOLOGY:

A randomizad trial was conducted at Sports & Spine Professionals Lahore from January to April 2014. Participants were included from patient population at Sports & Spine professionals, volunteers from the general population of Lahore, invited through informatory leaflets placed at clinics in general and orthopedic practitioners, physiotherapy clinics, local pharmacies and word of mouth. Inclusion Criteria was Male or females with age 30 year and Patients who can walk without helping aid.

Total 75 volunteer participants were included in the study. Eligible Participants were randomly placed into one of 3 treatment groups with 25 patients in each (Group A, B, or C).

Randomization was performed by using 75 numbered cards, folded and placed in a box, 25 cards of each category. At each subject randomizat ion time-point, to assure randomization, folded cards were thoroughly mixed together.'[1]2

The data was managed and analyzed using SPSS version 16. The Kruskal-Wallis tests was used to compare among groups while Friedman's T-test for comparison within group. P-value <0.05 was taken as significant.

RESULTS:

In this study, statically significant intra-group changes (p<0.05) were noted for mobilization with movement (Group B) and particularly mobilization with movement and Phonophoresis (Group C) in all outcome measures. The gender ratio of male to female was 45:55.

The mean age of patients was 56 with range of 35 to 72 years. In group A, Friedman's test results for Pre, post and follow up range of motion assessment showed Mean and SD values 131.80*4.619, 134.32+4.423 and 136.96+8.479 respect ively. Group B demonstrat ed 135.08*5.024,142.20+6.934, 142.44+7.428 and the outcomes of group C were 134.32+4.423, 137.56+8.140, and 146.84+8.086 respectively. Further if we look the p values all groups showed statistically significant results (.012, .003, .000 respectively).

Table 1. Range of motion (knee flexion)

Test	Group	Pre Assessment Mean±S.D	Post Assessment Mean±S.D	Follow up Mean±S.D	P Value	
Fried man (Inter group Comparison)	A	131.80±4.619	134.32±4.423	136.96±8.479	.012 (Significant)	
	B	135.08±5.024	142.20±6.934	142.44±7.428	.003 (significant)	
	C	134.32±4.423	137.56±8.140	146.84±8.086	.000 (significant)	
Kruskalwallis (Intra Group Comparison)	A,B,C	133.73±4.842	138.03±7.350	142.08±8.92	Pre	.015 (significant)
					Post	.009 (significant)
					Follow up	.004 (significant)

The analysis with Kruskal-Wallis test for intra g ro up com pa riso n sh owed sign ificant improvement in term of Mean and SD values in pre, post and follow up measurements

(133.73* 4. 842, 138. 03+ 7. 350 and 142.08+87.92 respectively). The p value were also significant for th ese measurements (Post:.009, Follow Up:.004)

The intra group analysis of pain level, stiffness and functional assessment showed significant improvement. The Mean and SD value of pre, post and follow up measurement for pain level were 3.7 253+ .87350, 2. 8507+ .49766 and 2.1360+ .44377 respectively: For stiffness 2.1467+.63551, 2.3600*.71923, 2.1200+.65161 respectively: and for functional assessment 3. 4897+ .7 13 61, 3.0218+ .4287 1 an d 2.2024+.46561 respectively. P values of all the measurements were also statistically significant.

Table 2. Comparison of Pain level, stiffness and Functional Assessment

Test	Group	Pre Treatment	Post Treatment	Follow Up
Kruskal Wallis	A,B & C	Pain		
		3.7253+.67350	2.850g2.49g66	2.13602.4407g
		Stiffness		
		2.1467z:.63551	2.36O0z:.71923	2.1200*.65161
		Functional Assessment		
		3.4897z:.71361	3.O218z:.42871	2.2024z:.46561

Test Statistics									
	Pre pain	Post pain	Follow pain	Pre Stiffness	Post Stiffness	Follow stiffness	Pre FA	Post FA	Follow FA
Asymp. Sig-	.003	.001	.001	.010	.011	.007	.008	.005	.000

DISCUSSION:

In the past KOA clinical trials utilized various manipulative therapeutic approaches. High-velocity, low-amplitude thrust techniques .'[13] Maitland's method was utilized in Deyle et aI.'s (2000) and Deyle et aI.'s (2005) trials with the addition of mobilization / manipulation of the entire kinetic chain (lumbosacral spine through feet), exercise and soft-tissue therapy.

Maitland mobilization was also used by Denham Fish et aI.'s (2008) in a clinical trial to compare the effect of combining mobilization with tropical application of capsaicin cream. The manipulative approach utilized in this clinical trial was MuII i g an's mob ilizatio n with m ov ement techniques, restricted to the knee joint using the principle of pain free mobilization. During the procedure a sustain mobilization glide was applied in the pain free direction.

The literature demonstrates that loss of knee flexion (and extension) is a significant cause of disability."" Interestingly, Deyle et aI.'s (2000) and Deyle et aI.'s (2005) found that the patients with the worst degenerative, x-ray changes (per Kellgren-Lawrence scores of 3 and 4) actually responded best (with greater pain relief and increased ROM and function)." [S,

Restoration of this motion appears to be a critical component of KOA treatment strategy. Further benefit to KOA may accrue through the addition of full kinetic-chain manipulative treatment (lumbar spine through foot) enhanced by exercise (a recognized standard of care) and soft-tissue treatment.'[16, While systematic/ literature reviews support therapeutic exercise, but determining which exercises and/or rehabilitative program & dosage has not been established. Interestingly, low tech/ simple exercise such as a slow, careful and slowly increase in walking speed and duration appears helpful.'[1"

Previous trials successfully utilizing KOA exercises (in combination with manipulative and soft-tissue therapy) included quadriceps setting, standing terminal knee extension, seated leg presses with elastic band, shallow eccentric squats with arm support as needed, and single or alternating step-ups.

Also potentially noteworthy is that in this trial, 1) the age range was broader (ages 30 to 75) than typical studies (usually ages 60 to 70), 2) the dosing delivered was 6 treatments, which is typically less than the number of treatments utilized in physical therapy, manual therapy, or general chiropractic practice. All of the above reported limitations could limit generalizability of the findings. [1,,1"

CONCLUSION:

This randomized clinical trial contributes to the current evidence available to practitioners about the potential utility of mobilization with movement, particularly mobilization with movement in

combination with Phonophoresis in the physical therapy treatment of knee osteoarthritis.

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