

Conventional Physiotherapy And Additional Krishna's Kinetikinetic Manual Therapy (KKMT) For Knee Osteoarthritis Rehabilitation: A Comparative Study.

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Abstract: Background: Osteoarthritis is the most prevalent chronic rheumatic disease in the World and Physiotherapy care is an integral part of its management. The development of new Physiotherapy techniques will, therefore, be helpful. This is why we conducted this study, to evaluate the effectiveness of conventional Physiotherapy alone (CPA) versus CPK (Conventional Physiotherapy associated with Krishna's Kinetikinetic Manual Therapy, which is a new technique) on pain, stiffness, function and knee Range of motion in patients with knee osteoarthritis. **Materials and Methods:** a controlled single blinded experimental study was undertaken on 14 patients with knee Osteoarthritis. Patients were recruited into two groups of 7 each: **CPA** and **CPK**. Both groups received treatment protocols for 5 weeks: 3 sessions per week. The WOMAC (Western Ontario and McMaster Universities Osteoarthritis Index), VAS (Visual Analogue Scale) and Goniometer were used for data collection before and after treatment. Data were analyzed using MS Excel 2010 and SPSS version 20 software. **Results:** Among our 14 patients were, 5 males, 9 females. **In the intervention group (CPK)**, the mean score before treatment for WOMAC, VAS, and ROM (Range of Motion) were respectively 52.43 on 96, 77.86 on 100, and 107.14°. After treatment, they were 17.86, 26.86 and 117.21° respectively. **In the control group (CPA)**, before treatment, they were respectively 50.00, 64.29, and 95.07°. After treatment, they were: 26.00; 38.86 and 104.28° respectively. The difference between the two groups was not significant for WOMAC ($p=0.477$), VAS ($p=0.263$) and knee ROM ($p=0.884$). **Conclusion:** KKMT added to conventional therapy was found to improve the treatment of symptoms in patients with knee osteoarthritis. More studies with larger and randomized sample sizes and longer periods of treatment may assess better, this new technique.

Keywords: Knee Osteoarthritis, Conventional Physiotherapy, KKMT.

1. Introduction

Osteoarthritis (OA) is the commonest chronic rheumatic disease in the World according to Nour, Oyoo, Joshi & Otsyeno, 2013 in their study on the patterns of knee, hand and hip osteoarthritis in the Kenyatta National Hospital [1]. It is estimated to be the "fourth leading cause of disability worldwide by 2020" [2], [3]. Woolf & Pfleger in 2003 and later in 2012, the World Health Organization (WHO) ratified that OA affects 18% of women against 9.6% of men, aged 60 years and older [4]. From a general point of view, rheumatic disorders are an important cause of suffering and eventual deaths in sub-Saharan Africa despite the concentration on other causes such as infectious diseases. Despite these reports on the increasing level of musculoskeletal problems, we are still stroke by the scarcity of data from Africa in this domain [5]. Osteoarthritis of the knee describes a clinical

syndrome of joint damage resulting in pain accompanied by varying degrees of functional limitation and reduced quality of life as outlined in the guideline of the National Collaborating Center for Chronic Conditions [6]. The most important attributes of this disorder are considered to be: pain, reduced mobility, poor ambulation and restricted participation in social activities [7]. Knee OA is mainly manifested by pain, stiffness, crepitus, limited range of motion (ROM) and sometimes swelling and deformity [8]. The Commissioning Guide in 2013 and the WHO in 2012 reported that around 20% of adults over 50 years and 40% over 80 years report disability from knee pain secondary to osteoarthritis [9], [4]. With the disease being most prevalent in women than in men: 18% against 10% respectively [10]. It is also noted that about "80% of patients with OA of the Knee suffer from a decrease in mobility and 25% of them

suffer an inability in performing everyday activities” [6], [11], [4]. OA of the knee also imposes an economic burden on the healthcare system given that; between 2015 and 2050, the proportion of the world's population over 60 years will double from 12% to 22%. By 2020, the number of people aged 60 years and older will outnumber children younger than 5 years, and by 2050, 80% of these older people will be living in low and middle-income countries. This point is particularly important because as the aging population rises the more people are susceptible to having OA, the more the health system put in more resources [12]. More so, the burden of OA can be measured not just by its impact on both the quality of life and psychosocial status due to pain, impaired mobility, and a decrease in functional capacities, but also on the high cost it occupies in the health system [7]. No matter the complexity of this disorder, several treatment protocols have been proposed to manage this situation for example: The American Academy of Orthopaedic Surgeons (AAOS), 2013, McAlindon, 2014 and the National Institute for Health and Clinical Excellence (NICE) guidelines recommend exercises including muscle strengthening and general aerobic fitness as core treatment of OA symptoms regardless of patient's age, comorbidity, pain, severity or disability [13], [14], [15]. OA treatment aims at reducing or controlling pain, improving physical function, preventing disability and enhancing the quality of life. Conservative treatment of Knee OA by Physiotherapy needs to be boosted, that is why we think that evaluating the effectiveness of additional Krishna's Kinetiketic Manual Therapy (KKMT) mobilization techniques, a new manual technique which has not yet been studied for knee OA, may be of great help as an additional therapy in the management of this condition.

KKMT mobilization is manual therapy technique applied after muscle and joint conditioning. It consists a range of techniques to restore joint motion and facilitate the homeostatic kinetics of the joint. Some of these techniques are joint gapping, 3D glide and functional articular rolling [16]. It is important to outline that this technique is pain-free and drug-free.

2. Materials and Methods

This was a controlled single blinded experimental study carried out at the National Rehabilitation Center for Persons with Disabilities (CNRPH), Yaoundé-Cameroon from June to September 2016. We evaluated the effectiveness of CPA (Conventional Physiotherapy Alone) versus CPK (Conventional physiotherapy associated to Krishna's Kinetiketic Manual Therapy -KKMT which is a new technique) on pain, stiffness, function and knee range of motion in patients with knee osteoarthritis. We used accidental and non-probabilistic sampling to obtain two groups: Control and Interventional. The control group received Conventional Physiotherapy alone (CPA) while the intervention (CPK) group received Conventional Physiotherapy and KKMT Mobilization. A structured questionnaire used for the two groups before and after the intervention. We included adults of both sexes diagnosed with knee osteoarthritis with ages ranging from 40-80 years and excluded from the study cases of total knee replacement (TKR), patients with knee osteonecrosis, acute knee injury, inflammatory arthritis of the knee, patients with an abnormal mental state, stroke patients and patients with unstable angina. Both groups were blinded to the treatment

protocols administered, so as not to influence the results during evaluation. A questionnaire on the socio-demographic profile of participants and some clinical aspects of knee OA was completed face to face by participants of both groups. These patients received treatment protocols for a period of **5 weeks** at the frequency of 3 working sessions per week. The two were evaluated in terms of the evolution of pain, stiffness, physical function and knee ROM. The main evaluating tool we used was the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) to evaluate knee pain, stiffness, and physical function. These questionnaires (WOMAC) were completed by participants of both groups on the first day of treatment and at the end of treatment. The total WOMAC was scored over **96**. A Visual Analogue Scale (VAS) for pain was distributed to participants. They were given instructions on how to locate their pain in a horizontal line of **100mm**. A pre-intervention pain score about the start of treatment and a post-intervention pain score at the end of the follow-up was obtained., Goniometric measurements of the affected knee were equally conducted (with the aid of a Goniometer) and ROM values of pre and post interventions noted.

Control Group: Conventional Physiotherapy Alone (CPA)

Patients in this group received the following treatment; **heat therapy** by infrared lamp which was placed about 30 centimeters from the knee surface for about 15-20 minutes, mobilization (active and passive) of the knee joint, strengthening of periarticular muscles especially the Quadriceps (isometric and dynamic), soft tissue manipulation (massage) of periarticular tissues (muscles, tendons), traction (manual and mechanic traction with the help of masses) and then stretching of retracted hamstrings.

Intervention Group: Conventional Physiotherapy and KKMT Mobilization (CPK)

Patients in this group received the combination of conventional physiotherapy and KKMT mobilization. KKMT consisted of Muscle and joint conditioning, knee gapping and the 3D glide. The muscle and joint conditioning included the; mobilization of patella superiorly, inferiorly, laterally and medially, the tibia glide_ (posterior, anterior, lateral and medial), brief muscular contraction of the quadriceps in which the patient was to use just 20% of his/her force, stretching of the hamstrings and quadriceps), the Knee gapping followed by the 3D glide which was done either in flexion or extension depending on cases; in flexion ; a medial rotation and a posterior-lateral glide (MRPL) which is done in prone and standing positions and a lateral rotation and anterior medial glide (LRAM) done in seating and standing positions. The paired T-test was used to compare within groups while the Independent t-test was used to compare between the two groups The data collected were coded, entered and analyzed using Excel 2010 and SPSS version 20 software. In the data cleaning process, some key variables were run and the consistency and coherency of the variables checked. The major analysis done was descriptive and inferential running frequency and calculating the confidence interval at 95% level of confidence. Inferential statistics were used, in which the independent sample t-test was used for comparing of means of pain, stiffness, function and ROM between control and intervention groups.

Dependent sample t-test was also used to compare means of pain, stiffness, function, and ROM in each group (before and after treatment). Level of significance was set at 0.05.

3. Results

This study included 14 patients, 5 (35.70%) males, and 9 (64.30%) females giving a sex ratio, female/male of 1.8. The mean age of participants was 60.00 years (SD=10.03). There were 7 patients in the control group, mean age of 64.00 years (SD=9.58) and 7 in the intervention group, mean age of 56.00 years (SD=9.23). All patients completed treatment and evaluation at baseline and at the end of the study. The compared results are presented below.

Table I: means of Pre-WOMAC scores between the control group and the Intervention group.

Variable (score)	Control (N=07)	Intervention (N=07)	Df	T-Value	P-Value
	Mean (SD)	Mean (SD)			
Pre-WOMAC total	50.00 (11.09)	52.57 (19.65)	12	-0.30	0.768
Post-WOMAC total	26.00(7.76)	17.86 (9.33)	12	1.77	0.101
Pre-Post	24.00	34.71	10.71	0.732	0.477

Table I above revealed the means; 50.00 and 52.57 for the control and Interventional group respectively. These means later decreased to 26.00 for the control group and 17.86 for the Interventional group, with a p-value of 0.477, which shows that there is no significant difference between pre-and post-WOMAC total scores for both groups, $t=0.732$, $df=10.71$.

Table II: means of pre, 2 weeks and post VAS scores in the control and intervention groups.

Variable	Control (N=07)	Intervention (N=07)	Df	T-Value	P-Value
	Mean (SD)	Mean (SD)			
Pre-VAS	64.29 (25.50)	77.86 (10.54)	12	-1.20	0.800
Post-VAS	38.29 (13.00)	26.86 (9.83)	12	1.85	0.089
SD difference	26	51	25	1.17	0.263

An independent sample t-test was conducted to determine whether there was a significant difference between the control and intervention groups with respect to means of their pre, and post VAS scores. The test revealed in Table II above, a decrease of the means from pre, to post VAS scores in the Control and Intervention groups, but there was no significant difference between the two groups given that the p-value $(0.263) > 0.05$. Control (M: = 64.29 to 38.29-). Intervention (M: = 77.86 to 26.86).

Table III: means of pre and post knee ROM values between the intervention and control groups.

Variable	Control (N=07)	Intervention (N=07)	Df	T-Value	P-Value
	Mean (SD)	Mean (SD)			
Pre-ROM	95.07 (12.06)	107.14 (6.19)	8.96	-2.36	0.043
Post-ROM	104.28 (9.66)	117.21 (3.62)	7.65	-3.31	0.011
Pre-Post	9.21	10.07	0.86	0.15	0.884

An independent sample t-test was conducted to examine whether there was a significant difference between the control and intervention groups in relation to knee pre and post-ROM. The test demonstrated that there was no statistically significant difference as shown in Table III above. Pre ROM ($T=-2.36$, $df=8.96$) and Post ROM ($T=-3.31$, $df=7, 65$), $p=0.884$.

4. Discussion

The purpose of this study was to evaluate the combined effectiveness of conventional Physiotherapy and KKMT Mobilization on pain, stiffness, function and knee ROM in patients with knee osteoarthritis. Both groups obtained successful outcomes as measured by reduction in the WOMAC and VAS scores and increase in knee ROM. There was no significant difference between the means of the conventional therapy and KKMT groups with respect to WOMAC and VAS scores. The post WOMAC scores in the control group; 26 ± 7.76 versus and 17.86 ± 9.33 respectively in the intervention group. Although there was no statistical significant difference between the two groups, participants in the intervention group (CPK) had greater improvement with respect to pain, WOMAC and ROM scores in comparison with their counterparts of the control group (CPA). This is the first study on KKMT for knee OA as for now since it is a new technique, but however, Lolita, (2016) in Cameroon had similar results on non-specific knee pain [17]. Ngwa & Sharma, (2016) in Cameroon found KKMT mobilization more effective over Mulligan mobilization for nonspecific shoulder pain in patients at the North West Regional Hospital [18]. The story isn't different with that of Alarmri, (2011) who equally registered a slighter improvement in the manual therapy and exercise group over the exercise group alone, but this difference wasn't statistically significant [19]. Contrarily, Ahmad & Daud (2016) in Pakistan found a significant difference between the manual therapy group and conventional physiotherapy group with respect to the VAS and the Index of the severity of osteoarthritis (ISOA) scores. The means of the post VAS of the conventional and manual therapy groups were 1.60 and 4.20 respectively, with a p-value of 0.03 confirming this significance since $P < 0.05$ [20]. This difference between our study and that of Ahmad and Daud, 2016 could be due to the following facts: firstly, our sample size was very small (14 patients) compared with 50 used in their study. More so, our period of follow-up was shorter (5 weeks) compared to that of Ahmad & Daud (8 weeks). Our study showed a slight improvement in the means of post-ROM between KKMT group (CPK) and Conventional therapy group (CPA) but the difference was not statistically significant: 117.21 ± 3.62 against 104.28 ± 9.66 respectively, with a p-value of 0.884. This result on knee

ROM differed with that of Alamri, (2011) in Saudi Arabia, who found significant amelioration of ROM in the manual therapy group with post mean scores in the exercise and manual therapy group: 119.10 and 128.10 respectively, this difference may be as a result of the fact that we added the amplitudes of two knees of each patient and took the average, given some patients had bilateral osteoarthritis (average amplitude of both knees is normally lesser) while others had just one knee affected (average amplitude greater), we think that this would have influenced the outcome within groups with respect to knee ROM [19]. As limits of this study; the sample size was very small for us to make important conclusions. We worked with a total of 14 patients considered to be small for studies of this caliber. Furthermore, the time for the follow-up wasn't enough to really appreciate the results obtained since it was just a 5 weeks' follow-up. To add, the non-probabilistic sampling used in this study could have influenced the results obtained as it is not representative of the population.

Conclusion

This study was aimed to evaluate the combined effectiveness of conventional Physiotherapy and KKMT Mobilization on pain, stiffness, function and knee ROM in patients with knee osteoarthritis in the CNRPH during a period of three months from June 14th to September 9th, 2016. Results show significant improvement of WOMAC, VAS and Knee ROM in both groups. The WOMAC, ROM and VAS scores improved more in the KKMT group than the Conventional therapy group, but there was no statistically significant difference in these scores between the Conventional Therapy and KKMT group versus Conventional Therapy group alone. KKMT Mobilization, when added to Conventional Physiotherapy greatly, improves the effectiveness of treatment of knee osteoarthritis with respect to pain, stiffness, and function and equally improve the ROM of the knee. From this evidence, it clear that Conventional Physiotherapy combined with KKMT mobilization improve the effectiveness of the treatment program for knee Osteoarthritis and ameliorate knee joint motion and function. We recommend to the Physiotherapist to integrate KKMT mobilization in the plan of treatment of knee OA.

Recommendations

To the Cameroon Society of Physiotherapy (CASP) and to all researchers in this field to promote more research on KKMT, using larger sample size and a longer period of treatment.

Perspectives

We wish to carry out further studies using a larger sample size, and a longer period of follow-up in order to better understand the effects of KKMT mobilization in reducing symptoms in knee osteoarthritis. We will also extend this study to other regions of Cameroon while using randomized samples since they are representative of the population. We also wish in our further studies to evaluate the improvements of patients receiving KKMT for knee OA with respect to their radiographic profiles (Kellgren-Lawrence radiographic grades).

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