



International Journal of Physical Education, Sports and Health

P-ISSN: 2394-1685
E-ISSN: 2394-1693
Impact Factor (ISRA): 5.38
IJPESH 2017; 4(2): 305-308
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www.kheljournal.com
Received: 04-01-2017
Accepted: 05-02-2017

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Effects of Eight (8) weeks Manual Strengthening Exercise in the management and treatment of Patients with Knee Osteoarthritis in Murtala Mohammed Specialist Hospital (MMSH) Kano, Nigeria

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Abstract

The study investigated the effects of 8 weeks manual strengthening exercise in the management of knee osteoarthritis (OA) in Murtala Muhammed Specialist Hospital (MMSH) Kano. A total number of (30) female knee osteoarthritis patients were selected for the study using criteria adopted from National Institute of Arthritis, Musculoskeletal and Skin Disease and were randomly assigned to two groups i.e Experimental and Control. Patients in both groups received conventional infrared radiation for 15minutes, 3 time a week on alternate days for 8 weeks, however patients in the experimental group had in addition, manual strengthening exercise, 3 alternate days a week for eight (8) weeks Assessment of pain, stiffness, and functional ability were taken using western Ontario and McMaster University Osteoarthritis Index (WOMAC). Range of motion (ROM) was measured using universal goniometer. Measurement were taken prior to the treatment and at the end of the eight (8) week treatment. Data collected was analyzed using ANCOVA. Significant differences were found to exist between the two groups in pain, stiffness, functional ability and range of motion (ROM) it was therefore recommended among others that manual strengthening exercise should be included in the prescriptions to patients with knee osteoarthritis to alleviate the pain and stiffness and assist in improving the functional ability and increased range of motion.

Keywords: Patients, goniometer, Osteoarthritis, Musculoskeletal

Introduction

Osteoarthritis is the most common condition affecting synovial joints as such it is a major cause of locomotor pain, the single most important rheumatologic cause of disability and handicap, and an important health care challenge with major resource implications. (Woolf and Ofleger, 2003). Osteoarthritis of the knee is the commonest health problem in the middle and old age, and the commonest cause of chronic disability after middle age. It is the type of arthritis seen in most of physiotherapy departments in Nigeria, causing pain and discomfort, limiting independence and reducing quality of life. It is 3.5times common in females than males. (Akinpelu, Alonge, Adekunle & Odekunle 2007) ^[10]. In the past, only elderly people suffered from knee osteoarthritis, however, knee osteoarthritis is now becoming evident at young ages, and this leads to increase in the economic and social burden of the disease. Many years of research and evidence based medicine have increasingly demonstrated many benefits of exercise, accordingly there has been a positive shift towards including exercise as part of the comprehensive treatment of OA (Ashe & Khan 2004) ^[11]. Research by Roddy, Doherty and Zhang (2005) ^[6] shows that exercise is one of the best treatment for knee osteoarthritis as it maintains joint range of motion (ROM), maintain weight, improve mood and outlook and promote general fitness. However, there is considerable controversy regarding what type of exercise is appropriate and what should be the recommended doses? Another important factors that needs consideration is that knee osteoarthritis is a costly diseases in economic terms as it entails cost for medication, hospitalization and work related losses as well as home care cost (Lozada, 2011) ^[3] among which patients spend highest percentage on medication much of which goes on pain related agents (Bitton 2009) ^[9]. To reduce this expenses, there is need to shift attention from the conventional treatment and management of OA to exercise as intervention.

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Quadriceps are the major muscle groups that affect knee stability and motion, stultjens, Dekker, & Vanbaar (2001) [5] reported that quadriceps femoris muscle weakness has been demonstrated to correlate with knee pain, range of motion (ROM) & functional instability. Quadriceps strengthening can be achieved by variety of ways. The international physiotherapist use complex, sophisticated and expensive equipment that are not readily available in most hospitals and also out of reach of the common man the OA patients in particular. Manual strengthening exercise which does not require special equipment or facility to strengthen a weak muscle could serve as better option to the sophisticated equipment in the treatment and management of Osteoarthritis (OA) patients. This study is therefore undertaken to investigate the effects of 8 weeks manual strengthening exercise in the management and treatment of patients with OA attending Murtala Mohammed Specialist Hospital (MMSH). Kano

Materials and Methods

Out of the total population of forty (40) female patients with osteoarthritis (OA) attending physiotherapy clinic of MMSH, thirty (30) volunteers were purposively selected as the study sample. Random sampling technique was used to distribute them into experimental and control groups. The consent form signed by participants prior to randomization were serially numbered. The odd numbers were separated from the even numbers i.e 1-29 and 2-30 respectively. All odd numbers from 1-29 formed the control group while all even numbers from 2-30 formed the experimental group. The purpose and procedures of the study were thoroughly explained to them. They were also informed that they reserve the right to withdraw from the study at any time without distribution. Experimental design of pretest posttest control was used for the study. Participants made four visits to the gymnasium of the physiotherapy department of MMSH, Kano. On the first and second visits, each participants age was taken, height and body weight were equally measured with stadiometer and standard physician scale respectively using standardized measurement procedure by. The third visit was to familiarize the participant with the exercise protocol. For the test, evaluation of pain and stiffness this measurement range of motion (ROM) and functional ability they were requested to pay one more visit to the gymnasium.

Range of motion measurement clients lie supine with both legs flat on the table. The fulcrum of the goniometer was aligned with the lateral epicondyle of the femur while the stationary arm was in line the greater trochanter and the middleline of the femur, the moving arm of the goniometer with lateral malleolus and midline of the fibula. The patient was then asked to bend or flex the knee as far as she can. Measurement of knee flexion by moving the movable arm of the correct reading on the goniometer. Normal ROM is 135-150 degree for pain, stiffness and functional disability WOMAC osteoarthritis index was stiffness and functional disability. The three subscale with 24 items question. The time for the exercise was 12noon. Clients in both groups received infrared radiation for 15 minute three time a week or alternate days for 8 weeks. the experimental group received additional treatment for 8 weeks as well sand bags were used by the client to exercise the quadricep muscle for eight week. The weight of the sand bag was determined by 50% of the client one repetition maximum (I R M) that is, maximum amount of Wight that one can lift in a single repetition for a given

exercise (William & vladmir, 2006) [1]. The treatment is preceded by 5min warm ups with 10-20 repetition after which she cool down less number of repetition for 5mins to return the muscle to normal. After observing 1-2 minutes rest from the warm up she was asked to sit comfortably on a chair with the back resting against the back support and knee at 90% of flexion both hand grasp the side of the seat a sand bag tied at the distant anterior aspect of the lower lrg. client were requested to fully extend the knee using concentric quadriceps action then to lower the leg using eccengtric quadriceps actions the baseline resistance was set at 50% of 1-12m which was increased progressive of v 5% of the original (baseline resistance)1-RM. this increase in will continue in the same as long propotion progressively no knee pain diet. The experimental group were disallowed for taking any analgesic drugs the training period. All the experimental group trained three (3) sessions per week for 8 weeks. each ytraining session consisted of v 4 set, with six repetition in per set. there was a minute rest between the sets. the control group were not allowed to set involved in any form of strengthening or vigorous physical activity til the end of the training programme.

Statically Analysis

Data generated from the study was analysed using descriptive statistic of means and standard deviation to organize the anthropometric values. ANSUA wased pre and post treatment outcme of the experimental & control groups.

Result

Descriptive statistics of means and standard deviation for age and physical characteristics of clients is presented in table I while table II-V present ANOVA summary of all the four variables used in the study (pain intensity, knee joint stiffness, range of motion (ROM) and functional ability).

Table 1: Age & physical characteristics of the two groups.

Variable	Group	N	X	Sd.
Age	Experimental	14	56.1429	8.25420
	Control	13	54.8462	7.61409
Weight	Experimental	14	85.7143	6.39024
	Control	13	84.1538	4.74071
Height	Experimental	14	1.5850	3.71567
	Control	13	1.5915	3.43623

Table I Present the physical characteristics of age, weight and height for the two groups. It was observed that the experimental and the control group have physical characteristics that is, there is insignificant difference in their weight and height

Table 2: ANCOVA summary to determine the difference in pain intensity between the experimental and control groups.

Source	Sum of square	df	mean square	F	P
Contrast	56.654	1	56.654	134.457	0.000
Error	10.112	24	0.421		
Total	66.766	25	57.075		

After adjusting the pre training scores, A significant difference was noticed in treatment groups at $p < 0.05$ showing that the pain intensity has significantly reduced resulting from the mammal exercise intervention. As a result of this observation, the null hypothesis was rejected.

Table 3: ANCOVA Summary to determine the difference in knee joint stiffness between the experimental and control groups.

Source	sum of square	df	mean square	F	P
Contrast	9.924	1	9.924	42.733	0.000
Error	5.574	24	0.232		
Total	15.498	25			

From the adjusting of pre training score carried out it was observed that there was significant difference $p < 0.05$ between the two groups the null hypothesis was there after rejected because significant difference exist between the experimental and control groups.

Table 4: ANCOVA summary to determine the difference in functional ability between control and experimental group

Source	sum of square	df	F	P
Contrast	1205.210	1	1205.210	0.000
Error	281.442	24	11.727	
Total	1486.652	25	1216.937	

After adjustment was carried out in the pre training score. A significant difference was noticed between the two group at $p < 0.05$ this observation lead to the rejection of the null hypothesis on the account that significant difference exist in the functional ability of the patients.

Table 5: ANCOVA summary to determine the difference in ROM between the experimental and control groups.

Source square	sum of square	df	mean of	F	P
Contrast	563.417	1	583.417	17.703	0.000
Error	790.947	24			
Total	1374.364	25	616.373		

When adjustment was done in the pre –training scores. A significant difference was observed between the two group the at $P < 0.05$ observation lead to the rejection of the null hypothesis on the account that significant difference was noticed between the two group.

Discussion

The study was designed to investigate the effect of eight (8) weeks manual strengthening exercise in the management of knee osteoarthritis (OA). After 8 weeks of exercise intervention it was observed that manual strengthening exercise lead to significant improvement in pain, stiffness of the knee joint, range of motion and functional ability in patients with knee O.A the findings are consistent with the findings of Jan, din Leau, Liu & Lin (2008) [7] in their research that investigated clinical effects of high and low resistance training for patients with knee OA both high and low resistance exercise led to clinically meaningful reduction in pain and improvement in functional performance with more effect in high resistance in patients with knee o.a

This present findings is also in line with the conclusion made by lin, lin, lin & jan (2009) [2] in their study of efficacy of 2 non –weight bearing interevntion, proprioception training verus strength training for patient with knee O A where strength training was found to be more effective in reducing pain and improving functional performance in patient with knee O A.

In the study conducted by Topp, Wooley, Hornyak & khader & khaleh in 2012 [7], it was found that resistance training reduce perceived knee joint pain, improved functional performance and had no effect on perceived knee joint

stiffness among adult with O A of the knee. This result is consistant with the present findings regarding, pain and functional performance but in contrast as regards the stiffness of the knee joint.

The result of this study supported the findings of Allison & matekel (2006) [14], frasen, who indicated that strength traing reduce pain, increase range of motion (ROM) and improves functional performance in people with knee OA, meaning that stiffness also improves as it the subjectives measurement of ROM

Conclusion

From the finding of this study, it was concluded that 8 weeks strengthening exercise intervention for patients with knee osteoarthritis was found to be effective in pain reduction stiffness and improve range of motion plus patient with knee osteoarthritis.

Recommendation

Mammal strengthening exercise should be included in the treatment and management of patient with knee O A while sand bags be with available in physiotherapy units both government and private hospital if possible be given to patient free of charges in government owned hospitals to alleviate their pains and joint stiffness while improving their functional ability and range of motion (ROM).

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