International Journal of PharmTech Research
CODEN (USA): IJPRIF, ISSN: 0974-4304, ISSN(Online): 2455-9563
Vol.9, No.6, pp 92-99, 2016

Mulligan versus Maitland Mobilizations In Patients with Chronic Low Back Dysfunction

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Abstract : Background: Chronic low back dysfunction(CLBD) is one of the most common complain of the working age population, there are many factors that contributing to CLBD and large group of them are without clear etiology. Both Mulligan and Maitland Techniques considered effective manual therapy techniques in treatment of CLBD. Yet difference in efficacy between both techniques is not known.
Objectives: The purpose of this study was to compare between the efficacy of Mulligan and Maitland techniques on pain level and Rang of Motion in patients with CLBD.
Methods: Thirty patients from, had participated in this study; they were randomly assigned in two groups (group A, B). With age ranged from 30 to 50 years. Group A consisted of 15 patient (8 males and 7 females) with mean age 40.0 (±4.81) years, received Mulligan technique and conventional physical therapy program. Group B consisted of 15 patients (5 males, 10 females) with mean age 42.93 (±6.68) years, received Maitland technique and conventional physical therapy program.
Outcome measures: visual analogue scale (VAS) for pain and modified Shober test for ROM.
Results: The results revealed that there was no significant difference between Mulligan and Maitland techniques on pain level and ROM.
Conclusion: Both Mulligan and Maitland techniques were shown to be effective in reducing pain level and improving ROM in patients with CLBD, no statistical significant difference was proven between both of them.
Key Words: Low back dysfunction, Mulligan technique, Maitland technique.

Introduction

Chronic low back dysfunction (CLBD) is the most common complaint of the working age population. In addition to human suffering, it causes an economic burden due to the use of medical services and absence from work[1].

There are many factors causing chronic low back dysfunction .These factors come from excessive loads to normal spinal structures or from normal loads applied to abnormal spinal structures. The loads transmitted to the spine can be influenced by posture, body mechanics, trunk strength, as well as flexibility in addition to strength of muscles of the pelvic girdle and lower extremities[2]. Common sources of low back dysfunction are injury or overuse of muscles, ligaments, facet joints, herniated discs and Sacroiliac joint dysfunction[3].

MWMs are Mobilizations with Movement and are applied to the peripheral joints. The underlying principle to MWMs is derived from Kaltenborn (1989) who argued that joint surfaces are not fully congruent,

physiological movements are a combination of rotation and glide, and glide is essential to pain free movement. Glide occurs in the direction of bone lever movement where its articulating surface is concave and in the opposite direction when convex. The treatment plane lies at a ninety-degree angle to the concave articulating surface of the bone and treatment is applied parallel to the treatment plane. The anterior-posterior and posterior-anterior movements used in Maitland's techniques follow the same planes in peripheral joints

Maitland mobilization technique are thought to benefit patients with lumbar mechanical pain through the stimulation of joint mechanoreceptors .These receptors are believed to alter the pain-spasm cycle through the presynaptic inhibition of nociceptive fibers in associated structures and the inhibition of hypertonic muscles ,which ultimately improve functional abilities.[4]

Passive joint mobilizations are often employed by physiotherapists in the treatment of spinal pain [5] The underlying mechanisms by which mobilizations produce clinical effects remains largely unknown, number of theories have been hypothesized including direct effects on articular and periarticular structures and on the biomechanical environment, modulation of nociceptive input within central nervous system and non specific placebo effects.[6,7]

Because of the proved efficacy of both Maitland and Mulligan lumbar mobilization in musculoskeletal dysfunction ,this study was conducted to compare between the efficacy of both of them on pain level and lumbar ROM in patients with chronic low back dysfunction.

Subjects and Methods

Aim of the study

Compare between the efficacy of Maitland and Mulligan lumbar mobilization on improving pain level and Lumbar ROM in patients with chronic low back dysfunction.

Materials and methods

This study was conducted at the outpatient clinic of Bolak Eldakror hospital. It was designed to investigate the effect of Mulligan MWM versus Maitland P-A mobilization techniques on pain level and Lumbar ROM, in patients with chronic LBD.

Design of study

Pre-treatment post- treatment design was used. Thirty patients from both sexes with LBD were randomly assigned into two groups with fifteen subjects in each one.

Subjects

Thirty (30) patients had diagnosed as (CLBD). Their age ranges from 30 to 50 years and selected randomly. Group A 15 patients had received Mulligan mobilization with movement (MWM) and conventional physical therapy program which included (stretching exercises and strengthening exercises for back and abdominal muscles) only. Group B 15 patients had received Maitland postero- anterior mobilization and same conventional physical therapy program, lasting For 12 session (3 sessions/week) over four weeks period.

Group A (Mulligan) 15 patients received MWM technique and conventional physical therapy ex program in the form of (stretching ex. for lower back muscles "by knee to chest" and stretching hamstring muscles) and strengthening exercises for back muscles by bridging and active back extension[8] and strengthening exercises for abdominal muscles by sit up exercise, and posterior pelvic tilt[9].

Group B (Maitland) 15 patients received postero-anterior mobilization technique and same conventional physical therapy treatment like group A.

Inclusion criteria:

1- Age between 30 to 50 years old.
2 -Suffering from chronic LBD based on referral from orthopedic surgeon
3- Duration of illness more than three months[10]**.**

Exclusion Criteria

a. Patients with any previous back surgery.
b. Neurologic deficit.
c. Patients with congenital musculoskeletal deformity.
d. Cardiopulmonary disease with decreased activity tolerance.

Materials

1- Visual Analogue Scale (VAS) for measurement of LBP level[11].
2- Tape measurement.
3- Mobilization belt

Methods of patient evaluation

A) Pain assessment

LBP level measured by using the VAS which uses a line of 10 cm, divided from 0 to 10, 0 refers to no pain and 10 refers to the worst pain[11,12]**.**

B) ROM Assessment:

Modified schober test used in measuring lumbar flexion, extension and side bending to the right and the left [13].

Figure (1)application of modified schober test

figure(2) flexion ROM measurement

Figure(3) extension ROM measurement

figure(4) lateral bending ROM measurement

Treatment procedure

1- Therapeutic exercises program

Strengthening exercises for back muscles by active back extension and bridging 8 and strengthening exercises for abdominal muscles by sit up exercise, and posterior pelvic tilt,[9], 12 sessions, three/week for one month. Each exercise was done ten times at each session with hold for six seconds at the end of the range[8].

2- Mulligan MWM technique

It was done at level just below ASIS (at level of L4-L5 spinous process), ten times/session, for 12 sessions three/week every other day for 4 weeks, [14]**.** It was applied for group A only.

3- Maitland P -A mobilization:

It was done at same spinous level (L4-L5)while therapist stands to side of patient placing their pisiform/ulnar surface of hand over the selected spinous process (SP) with their wrist in full extension, ten times/session, for 12 sessions three/week every other day for 4 weeks period**.** It was applied for group B only

Statistical Analysis

All statistical measures were performed through the Statistical Package for Social Studies (SPSS version 18 for windows). Prior to final analysis, data were screened for normality assumption, and presence of extreme scores. This exploration was done as a pre-requisite for parametric calculation of the analysis of difference and analysis of relationship measures. To determine similarity between the groups at base line, subject age, height, and body weight were compared using independent t tests.

The current test involved two independent variables. The first one was the ±tested group; between subjects factor which had two levels (Group A receiving MWM& Group B receiving P-A mobilization The second one was the (training periods); within subject factor which had two levels (pre and post). In addition, this test involved five tested dependent variables VAS, *ROM of trunk flexion, extension, right bending, and left bending*. Accordingly, 2×2 Mixed design MANOVA was used to compare the tested variables of interest at different tested groups and training periods. The MANOVAs were conducted with the initial alpha level set at 0.05.

Results

There were no statistically significant differences (P>0.05) between subjects in both groups concerning age, weight, and height (Table 1). There were also no statistically significant differences between groups for any outcome variables at baseline (pre-intervention).

VAS and ROM of trunk flexion, extension, right bending, and left bending

Statistical analysis using mixed design MANOVA analyzed thirty patients assigned into two equal groups. It revealed that there were significant within subject effect ($F = 91.428$, $p = 0.000$) but there were no significant effects between subject effect ($F = 0.779$, $p = 00.595$) and treatment*time effect ($F= 1.274$, $p = 0.308$). Table (2) present descriptive statistics (mean ± SD) of all detective variables. In the same context, the multiple pairwise comparison tests revealed that there were significant decreases ($p <0.05$) in VAS and ROM of trunk extension in the post treatment condition compared with the pretreatment one in both groups and significant increase ($p <0.05$) in ROM of trunk flexion in the post treatment condition compared with the pretreatment one in group B. Table (3) presents multiple pairwise comparisons between pre and post treatment values of all detective variables in both groups.

Regarding between subject effects multiple pairwise comparisons revealed that there were no significant differences in VAS and ROM of trunk flexion, extension, right bending, and left bending between

both groups ($p > 0.05$). Table (4) presents multiple pairwise comparisons between group A and group B of all detective variables in both groups.

Table 1: Descriptive statistics and unpaired t-tests for the mean age, weight, and height of the patients with B CLBD for both groups.

	Age (years)	**Weight (kg)**	**Height (cm)**
Group (A)	40±4.8	83.5±7.8	166.7±4.3
Group (B)	42.9±6.6	80.8±5.96	167.7±6.85
t-value	-1.38	1.05	-0.476
p-value	0.179	0.303	0.639

Table 2: Descriptive statistics of the VAS and ROM of trunk flexion, extension, right bending, and left bending in patients with CLBD

Dependent variables	**Group A**		**Group B**	
	Pretreatment	**Post treatment**	**Pretreatment**	**Post treatment**
VAS	6.6±0.8	2.4±1.05	7.1±1.06	3.33±1.44
ROM of trunk flexion	20.5±1.1	21.3±1.14	19.76±1.42	21.4±3.38
ROM of trunk extension	12.1±0.76	10.43±1.8	12.2±0.99	11.3±1.09
ROM of right bending of trunk	41.1±1.31	41.16±1.21	41.8±1.69	42.1±1.51
ROM of left bending of trunk	41.16±1.21	41.43±1.13	42.13±2.31	42.25±1.86

VAS:Visual Analogue Scale.

Table 3: multiple pairwise comparisons between pre and post treatment values for each group.

Multiple pairwise comparison tests ±post hoc tests for* VAS and ROM of trunk flexion, extension, right bending, and left bending *at pre and post treatment for both groups										
	Group A					**Group B**				
Dependent variables	**VAS**	**ROM of trunk flexion**	**ROM of trunk extension**	**Right bending of trunk**	**Left bending of trunk**	**VAS**	**ROM of trunk flexion**	**ROM of trunk extension**	**Right bending of trunk**	**Left bending of trunk**
Pre Vs. Post treatment	0.000*	0.156	0.000*	0.809	0.383	0.000*	0.006*	0.013*	0.281	0.742

VAS:Visual Analogue Scale, *The mean difference is significant at the alpha level ($p < 0.05$).

Table 4: multiple pairwise comparisons for pre and post treatment values between both groups.

***Multiple pairwise comparison tests (post hoc tests) for* VAS and ROM of trunk flexion, extension, right bending, and left bending at pre and post treatment between both groups**										
	Pre treatment					**Post treatment**				
Dependent variables	**VAS**	**ROM of trunk flexion**	**ROM of trunk extension**	**Right bending of trunk**	**Left bending of trunk**	**VAS**	**ROM of trunk flexion**	**ROM of trunk extension**	**Right bending of trunk**	**Left bending of trunk**
Group A Vs. Group B	0.204	0.126	0.76	0.217	0.164	0.053	0.914	0.123	0.074	0.167

VAS:Visual Analogue Scale. *The mean difference is significant at the alpha level ($p < 0.05$).

Discussion

In comparison between the two groups, the results obtained in the current study showed non significant difference in the level of pain, active lumbar flexion, extension and bilateral side bending ROM between group A which received (Mulligan MWM)and group B which received (Maitland P-A mobilization) This was demonstrated by analyzing the data obtained by mixed design MANOVA.

Group A (Mulligan technique)

1. Pain severity

To examine the analgesic effects of MWM technique, comparison between pre and post results of pain assessment using visual analogue scale for the Chronic LBP patients in group A was conducted. The results showed a significant decrease in LBP at the end of treatment program.

Several studies evaluated the initial pain relieving effect of the MWM technique. One of these studies was done on patients with lateral epicondylalgia using a randomized, controlled, repeated measures study design [15,16]. The results demonstrated an immediate and substantial increase in pain-free grip force (PFG) in the order of 46–48% following treatment, which was significantly greater than placebo and control (no treatment). Pressure pain threshold (PPT) improved approximately 10% under the treatment condition, which was significantly greater than placebo and control.

2. Range of motion (ROM):

Concerning lumbar spine ROM, there was significant increase at lumbar spine flexion, extension and bilateral side bending ROM post treatment in comparison to pre treatment group.

MWM technique has the ability to improve ROM in many joints and this was supported in a study was held at 2001 **[17]** MWM technique to the elbow of thirty two patients with lateral epicondylalgia to study its effect on shoulder ROM .MWM applied to the elbow significantly changed internal rotation and external rotation ROM of the shoulder, in patients with unilateral lateral epicondylalgia, both on the affected side and the unaffected side. External rotation ROM of the shoulder was significantly limited in patients with unilateral lateral epicondylalgia. It is theorized that limitation of shoulder ROM was due to facilitated muscle activity of the shoulder musculature, and that the MWM reduces this level of facilitation, thus allowing increased shoulder ROM.

Group B (Maitland P-A mobilization)

1-Pain severity

To examine the analgesic effects of MWM technique, comparison between pre and post results of pain assessment using visual analogue scale for the Chronic LBP patients in group B was conducted. The results showed a significant decrease in LBP at the end of treatment program comparing to pretreatment measures.

Research had shown that Maitland P-A mobilization can produce significant mechanical and neurophysiological effects[7,18,19,20]**.**The mechanism is still relatively unknown, especially in regards to the spine, and is subject to further research**(20).**However, several theories have been established in accordance with effects seen, including the effects of pain relief, increasing range of motion and the influence on the autonomic nervous system.PA mobilization has shown to be effective at reducing pain in patients with low back pain (LBP) [20] **.**

2-Range of motion (ROM)

Concerning lumbar spine ROM, there was significant increase at lumbar spine flexion, extension and bilateral side bending ROM post treatment in comparison to pre treatment group.

Some evidence suggests an increased range of movement (ROM) of lumbar extension[21,22,23]. It was reported that P-A mobilization force at L4 has been found to cause segmental movement of the lumbar spine and generalized extension of the spine as far as T7 [22]. However, literature is still variable on the overall effects of ROM and pain.

In summary, the findings of this study demonstrated that there was no statistical significant difference between group A which received (Mulligan MWM) technique and group B which received (Maitland P-A mobilization)min pain threshold level, lumbar flexion, extension and bilateral side bending

These findings suggested the acceptance of the null hypothesis that stated that there was no significant difference between Mulligan MWM technique and Maitland P-A mobilization technique on reduction of pain severity. And acceptance of the null hypothesis that stated that there was no significant difference between Mulligan MWM technique and Maitland P-A mobilization technique on increasing the range of motion of lumber flexion, extension and side bending.

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