

## IMPROVING RANGE OF MOTION OF LUMBAR JOINT BY APPLYING MOTOR CONTROL EXERCISES IN NON-SPECIFIC LOW BACK PAIN

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### ABSTRACT

*Non-specific low back pain is a symptom that can occur with unclear causes. The condition can cause muscle pain, muscle spasm and imbalance muscles, so the stability of lower abdominal and back muscles will be reduced. In addition, another negative impact of the condition is the range of motion of the lumbar joint will decrease significantly. The motor control exercise (MCE) is one of exercise methods that can improve stability and range of motion (ROM) of lumbar joint.*

*The aim of study is to evaluate the effect of motor control exercise in improving range of motion of lumbar region in non-specific low back pain condition.*

*This study used an experimental study with one-group pre and posttest design. Twenty patients with non-specific low back pain selected with purposive sampling, perform motor control exercises for 12 time treatments by Physiotherapist. The range of motion was measured with goniometer*

*The result shows that 20 participants had a significant increase of the lumbar mobility after getting 12 MCE treatments. The Wilcoxon test shows the significant value with  $p < 0,05$  which means that there is a significant effect of motor control exercise in improving the range of motion of the lumbar area in non-specific low back pain condition.*

*Keywords: Non-Specific Low Back Pain, Motor Control Exercise, Range of Motion of Lumbar Joint*

### INTRODUCTION

Low Back Pain (LBP) is one of the most common health problems in almost all countries. The Global Burden of Disease (2017) argues that musculoskeletal disorders are the second largest contributor to disability and low back pain is one of the causes of disability and functional disorders. Almost 70% -80% of the population of developed countries has experienced it (The Global Burden of Disease, 2017). The prevalence of low back pain (LBP) in Indonesia is categorized as one of the joint disease based on medical diagnosis and the symptom about 11.9% and 24.7% respectively (Badan Penelitian dan Pengembangan Kesehatan, 2013).

Fitzpatrick and Paula (2011) argues that the classification of low back pain is divided into three categories called triage diagnostic, namely specific LBP, nerve irritation and nonspecific LBP. In non-specific low back pain, they also report that there is no exactly structure causing pain such as lumbago, myalgia syndromes, muscle spasm, mechanical LBP, back sprain, and back strain. Furthermore, Abdullah (2012) describes that the symptoms of the LBP include pain in the lumbar area that may radiate to one or both thighs, but not below of knee. In addition, Susanti (2012) also investigates that there are some patient's complaint in low back pain case, namely pain, lower back muscle spasms causing muscle imbalance, decreasing core muscle stability and limiting lumbar mobility. Those issues can decrease functional activity in daily living (Susanti, 2012). People who have a low back pain syndrome do not use the lumbar and pelvic muscles when they are doing daily activities (Bystrom, Rasmussen-Barr & Grooten, 2013). As the result, they will feel some symptoms in the lumbosacral region such

as pain, back muscle spasm, limitation of lumbar area and weakness on back and inferior limb muscles. They also report that the symptoms can lead limitation when they want to do activity daily living such as waking up from sitting, bending, sitting, standing and running.

Furthermore, Sudarsini (2013) proves that the case also have physiological effect that really disturb people in doing their daily activities. The most negative impact related to physiological effect is the limitation of range of motion in lumbar region (Bystrom, Rasmussen-Barr & Grooten, 2013; Sudarsini, 2013). According to Sudarsini (2013) most patients with non-specific low back pain will reduce their lumbar area movements in any ways to decrease the pain that they feel. They believe that when they try to restrict their movement, the symptoms will disappear from them and the healing process will be faster so they can do physical activities (Sudarsini, 2013). In fact, Bystrom, Rasmussen-Barr & Grooten, (2013) state that reducing activities create many problems related to physiological condition because it can cause joint stiffness of Lumbar area, asymmetric posture and muscle weakness.

Saragiotto, et al. (2016) suggests that exercise therapy is the most common method used for Physiotherapists to treat the patients with low back pain condition. He recommends that the Motor control exercise (MCE) is one of the exercise therapy method used in treating the clients because it is a simple technique and easy for the patients in applying at home as a home program. In addition, Saragiotto, et al. (2016) and Bystrom, Rasmussen-Barr & Grooten, (2013) state that the Motor control exercise (MCE) is developed to improve the client's coordination, control, strength and endurance of the back muscles. During the intervention, they suggest that the patients are taught how to contract the trunk muscles in a specific way and the patients continue to repeat the exercises until they can maintain the muscles even when they are breathing normally. There are some positive impacts of the MCE, namely improving the power of trunk muscles, creating a better posture and increasing range of motion (Saragiotto, et al, 2016). Therefore, the researcher intends to examine the effect of motor control exercise in changing range of motion in non-specific low back pain.

## **METHODS**

### **Location and research design**

The study was conducted in Dr. RS Tadjuddin Chalik hospital and Asy-Syifaa Clinic in Makassar, South Sulawesi. This research is an experimental research with pre-experimental design one-group pre and posttest designs.

### **Population and Sampling**

The research population were all patient diagnosed nonspecific low back pain by physician. There are 20 patients as sample in this project. The following inclusion criteria were used: (1) types of participants: patients with 35-65 year age range, (2) type of patients: diagnosed with nonspecific low back pain; and (3) types of outcome measured: getting 12 times therapy with motor control exercises at Asy-Syifa Clinic and Dr. Tajuddin Chalid hospital from 29 of March to 29 of April 2018. The following exclusion criteria were used: (1) the patients have fracture or direct traumatic history; (2) the clients do not complete their 12 treatment sessions; (3) the patients do not come to evaluate their condition to get the post test result.

### **Method**

The data were collected by the researcher by using interview guidelines. Information about the characteristics and general condition of the respondent, including name, age, religion and history of the disease were obtained by in-depth interview. The range of motion (ROM) data

were obtained by applying direct measurements to non-specific low back pain patients with a goniometer.

### Data analysis

The collected ROM data was tested by using normality test and then using the Wilcoxon test to know the effect of using the Motor Control Exercise. All statistic tests are performed using SPSS Statistic Data Editor 23 software.

## RESULTS

The results of this study indicates that the sample characteristics of the research for each variables examined, including the standard deviation, mean, minimum, maximum, and median values. The first table shows that the mean age and sex of the sample study were age 56-64 years and male, respectively.

**Tabel 1. Distribusi Sampel Berdasarkan Jenis Kelamin, Umur dan Pekerjaan**

Karakteristik Responden	F	%
<b>Jenis Kelamin</b>		
Laki-laki	13	65
Perempuan	7	35
<b>Umur</b>		
35-44 tahun	1	5
45-54 tahun	7	35
55-64 tahun	11	55
65 tahun	1	5

F= Frekuensi; % = persentase

Sumber: Data Primer, 2018

The second table describes that there is a significant result after the patients have done 12 treatment sessions of motor control exercise in changing range of motion in in lumbar area with non-specific low back pain responders.

**Tabel 2. Distribusi Perubahan Range of Motion (ROM) Lumbal Sebelum dan Setelah Diberikan Motor Control Exercise**

Gerakan	Pretest				Total	Posttest				Total		
	Kategori		Kategori			Kategori		Kategori				
	Limitasi	Normal	Limitasi	Normal		Limitasi	Normal	Limitasi	Normal			
	N	%	N	%	N	%	N	%	N	%	N	%
Fleksi	20	100	-	-	20	100	7	35	13	65	20	100
Ekstensi	20	100	-	-	20	100	5	25	15	75	20	100
Lateral Fleksi Dekstra	20	100	-	-	20	100	4	20	16	80	20	100
Lateral Fleksi Sinistra	20	100	-	-	20	100	9	45	11	55	20	100
Rotasi Dekstra	20	100	-	-	20	100	11	55	9	45	20	100
Rotasi Dekstra	20	100	-	-	20	100	9	45	11	55	20	100

N = jumlah responden, % = persentase

Sumber: Data Primer, 2018

In any movement of lumbar such as flexion, extension, right and left lateral flexions and left and right lumbar rotations show significant improvement. It can be seen from the distribution of minimum, median and maximum data (Table 3).

Tabel 3. Distribusi Nilai Minimum, Median dan Maksimum pada Responden *non Specific Low Back Pain* Sebelum dan Setelah Diberikan 12 kali *Motor Control Exercise*

Gerakan		Min	Median	Max	P
Fleksi	<i>Pretest</i>	10	45	58	0,000
	<i>Posttest</i>	30	60	85	
Ekstensi	<i>Pretest</i>	5	15	19	0,000
	<i>Posttest</i>	10	21	30	
Lateral Fleksi Dekstra	<i>Pretest</i>	10	20	24	0,000
	<i>Posttest</i>	25	25	30	
Lateral Fleksi Sinistra	<i>Pretest</i>	10	17.5	23	0,000
	<i>Posttest</i>	15	26	30	
Rotasi Dekstra	<i>Pretest</i>	5	25	31	0,000
	<i>Posttest</i>	15	35	45	
Rotasi Sinistra	<i>Pretest</i>	5	30	35	0,000
	<i>Posttest</i>	15	45	45	

Sumber: Data Primer, 2018

The result of statistical test obtained with significance value at each motion is  $p < 0,05$  indicating that there is a significant change of range of motion after 12 times motor control exercise.

## DISCUSSION

Fitzpatrick & Paula. (2011) state that the Low Back Pain case can occur due to many factors such as individual, work and environmental factors. In some research, the prevalence of low back pain is described that women is more than men because women have more physically works, hormonal changes and more somatic symptoms than men (Andini, 2015; Fitzpatrick & Paula, 2011). Moreover, Vos, (2010) states that the incidence of LBP between men and women is unclear which one is higher both of them. Hoy, *et al.* (2012) and Vos, (2010) argue that older population is the high risk of low back pain because they tend to suffer from muscle elastic problem. They found that Low back pain case can occur since pubertal stage then the phenomenon declines at 20-29 years old or young adult period. However, the case will progressive increase at 30 years old and the highest prevalence occurs in old adult at 40- 69 years old (Hoy, *et al.*, 2012). Andini (2015) also report that people who are close to 65 years old is twice risk to get low back pain than people who are below than 65 years old. Work time, attitude toward work and workspace are the risk factors causing low back pain problem.

Vos. (2010) and Hoy, *et al.* (2012) prove that most people who have worked for more than ten years will feel frequently pain, especially the workers who have wrong attitude and position in working because those factors can cause spasm or overstretch on their muscles. Complaints of patients with non-specific low back pain are pain and spasms in the lower back muscles that can cause limited range of motion in any movements of lumbar region such as flexion, extension, lateral flexion and rotation (Fitzpatrick & Paula, 2011). They also argue that this condition can lead a poor muscle control in the pelvic lumbar muscles then stimulate imbalance muscles in the pelvic lumbar region.

Saragiotto, *et al.* (2016) indicate that the stability of pelvic lumbar area will refer to the ability of the back muscles to keep the spine in maintaining its optimal position during applying physical activities. Based on the recent study, motor control exercise is one of the effective exercise given to the patients with non-specific low back pain because motor control exercise is an exercise developed form combining the core stability exercises and active movement (Saragiotto, *et al.*, 2016). The active movement can facilitate the muscles to develop muscle ability so the functional muscle will be optimal in doing daily activities (Saragiotto, *et al.*, 2016; Susanti, 2012). Therefore, Kisner, (2012) suggest that to produce an adaptation in increasing

range of motion in the pelvic lumbar region, the patients should obtain 12 sessions with the motor control exercise program.

Furthermore, the recent study also shows that the effect of motor control exercises on non-specific low back pain patients is the activation of the trunk stabilizer muscles as spinal stabilizers. This statement is supported by the theory of Kibler, Press & Sciascia, (2006) describing that the mechanism of stabilization by deep trunk muscles occur due to stimulation of the limb motion through loading and postural conditions. They also report that the MCR will stimulate the central nerve system developing stabilization in the pelvic lumbar area and delivering to the core muscles to activate the muscle in producing stabilization and nerve control in pelvic lumbar region. In addition, the Motor Control Exercise will improve performance of the deep trunk muscles (Bystrom, Rasmussen-Barr & Grooten, 2013; Saragito; 2016).

In addition, the recent study found that by applying the MCE, the muscles will contract in a good coordination that will reduce intra discal pressure and workload of the lumbar muscles, so the soft tissue is not easy to get injuries and the lumbar muscle tension is reduced (Kisner, 2012). Muscle tension release will improve the muscle pump that can increase blood circulation in back muscles, so oxygen and food supply in the muscle will upsurge significantly and the pain in the pelvic lumbar region will decline (Bystrom, Rasmussen-Barr & Grooten, 2013; Kiner, 2012; Saragito; 2016).

Finally, the research also showed that another impact of the MCE program is releasing the tension of global muscle trunk such as external oblique, rectus abdominis and iliocostal muscles to become relaxed muscles, so the limitation in applying flexion, lateral flexion and rotation movements in the lumbar region can decrease significantly. The result also supported by Kibler, Press & Sciascia (2006) that deactivation of the deep trunk muscle will cause the muscle components playing a role in performing the lumbar extension (multifidus muscle) become more relaxed and improve the range of motion of lumbar extension motion. As a consequence, the range of motion of lumbar region will increase and the spine will be in neutral position. Kisner (2012) also argues that people will be easy in doing daily activities without limitation if the spine in a good stabilization.

## **CONCLUSIONS AND RECOMMENDATIONS**

The authors conclude that there is an influence of motor control exercise in changing the range of motion in non-specific low back pain. This study is expected to be a reference for physiotherapists in hospitals or clinics in preparing an intervention program for non-specific low back pain sufferers. The results of this study can also be a reference for further researchers who want to continue this research in order to be a differentiator or complement.

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