International Journal of Medical Science and Dental Research

Effectiveness of Motor Control Exercise on Increasing Functional Ability of Lumbar Joint in Non-Specific Low Back Pain

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Abstract : *Non-specific low back pain is a symptom of low back pain that occurs without unknown cause, could result in pain, muscle spasms, and imbalance muscle, and decrease the stability of the abdominal and lower back muscles. Motor control exercise is a method that activates deep muscle and global muscle in order to improve the coordination, control, and capacity of the trunk muscles to enhance the functional ability of the lumbar. This study used an experimental study with a one-group pretest-posttest design. The sampling technique is purposive sampling with 20 respondents, age 35 – 65 years, no fracture, and receive no medication related to pain. Measuring tools used is Rolland Morris Disability Questionnaire to determine daily functional capabilities of the Lumbar joint before and after 12 times of MCE. The data collected is analyzed by SPSS 23.0 with significance value p<0.05. The results shown that 20 respondents had an increase in lumbar functional ability (p<0.01). The conclusion is motor control exercise is an effective treatment to increase functional ability of the lumbar joint in non-specific low back pain.*

Keywords - *functional ability, low back pain, lumbar joint, motor control exercise, rolland morris disability questionnaire*

I. INTRODUCTION

Low Back Pain (LBP) is one of the most common health problems in the community in almost all countries. LBP is a pain syndrome that occurs in the lower back region and is a work-related musculoskeletal disorder. The Global Burden of Disease (2017) states that musculoskeletal disorders are the second largest contributor to disability and low back pain is one of the causes of disability and functional disability[1]. The prevalence of musculoskeletal disease in Indonesia is based on a diagnosis by health workers in 2013 of 11.9% and based on the diagnosis or symptoms that is 24.7%[2]. Individuals who have experienced LBP certainly not only feel the pain but there are changes experienced especially in daily activities. Of the 180 patients with acute LBP who followed for one year, it turned out that 38% experienced fixed functional limitations[3].

Diagnostic Triage divides into three categories of LBP, i.e. non-specific LBP, nerve irritation, and specific LBP. Non-specific low back pains can occur due to several risk factors such as age, body mass index, pregnancy, and psychological factors. An elderly person will experience non-specific LBP due to decreased function of the body especially bone, so it is no longer elastic as in the youth. Heavy physical activity such as lifting weights, lowering, pushing, pulling, throwing, moving or rolling loads by hand or other body parts is called manual material handling can cause LBP especially non-specific LBP[4].

Problems in the low back area can cause pain, lower back muscle spasms that cause muscle imbalance so the stability of the abdominal muscles and lower back decreases, lumbar mobility is limited resulting in decreased functional activity. A person with low back pain does not activate or use the muscles of the lumbar and pelvic stabilizers when performing an activity. This results in disturbance in the presence of pain in the lumbosacral region, spasms of the back muscles, the limitation of back motion and decreased back muscle strength and inferior limb, so it can cause the limitations of the function of the disorder when waking up from sitting, when bending, when sitting or standing long and running[5].

In the case of Low Back Pain (LBP) problems are often found not only pain, however, there is also an accompanying physiological aspect, one of which is the reduction in reach motion (range of motion)4. When experiencing lower back pain, a reduction in ROM by naturally done by the body to reduce pain avoid further damage, keeping the tissue being sought for such a cure not to be experienced severe physical stress intended to speed the healing process[4,5].

Exercise therapy is the most frequently used form of intervention by the physiotherapist in dealing with the condition of the patient with lower back pain complaints. One form of exercise used is motor control exercise (MCE). This motor control exercise (MCE) is a simple yet effective type of exercise to treat patients with LBP complaints. Motor control exercise (MCE) was developed with the aim of improving coordination, control, strength, and endurance of the back muscles[6].

II. METHODS

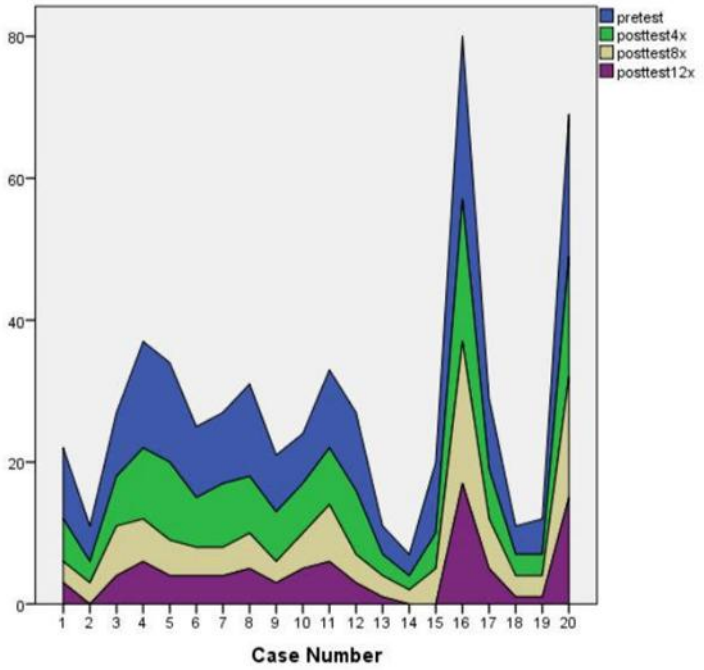
This type of research is Quasi-Experimental with a pre-experimental one-group pretest-posttest design. The population in this study were all patients of poly physiotherapy in RSK. Tadjuddin Chalid and Asy-Syifa Clinic who experienced non-specific low back pain. The total sample is 20 people aged 35-65 years. Data collection was done by the researcher using the interview method and questionnaire. The questionnaire used to measure the lumbar functional ability of respondents was Rolland Morris Disability Questionnaire. The collected data is done by the normality test using Saphiro-Wilk then tested Wilcoxon. The statistical test was performed with the help of a computer using SPSS 23.

III. RESULTS

The average age of the study sample was 54.5 years old consisting of men 12 people (60%) and women 8 people (40%).

Table 2. Test Result Analysis of Motor Control Exercise Effect on Lumbar Functional Capability Changes

	Mean	SD	Wilcoxon Test
Pre-test	10.10	5.160	0,0001
Post-test 4x	7.60	4.535	0,007
Post-test 8x	5.85	4.637	0,001
Post-test 12x	4.35	4.452	0,0001



Picture 1. Graph of Lumbar Functional Ability Change

Based on table 2, the results showed that there was a significant change in the functional ability of the lumbar joint after administration of Motor Control Exercise after 12x treatment ($p < 0.05$). This is illustrated by the diminishing area of the graphics area indicating a better change in the functional capabilities of the respondents.

IV. DISCUSSION

Complaints in people with non-specific low back pain in the form of pain and muscle spasms in the lower back can cause limited joint motion of both flexion, extension, lateral flexion and rotation. This indicates poor muscle control in the pelvic and lumbar muscle as well as the imbalance between the lumbopelvic muscles. Lumbopelvic stability refers to the ability of the back muscles to keep the spine in its optimal position during motion activity[7].

Based on the results of the study, motor control exercise is one of the effective exercises given to patients with non-specific low back pain. Motor control exercise is a development of core stability exercise combined with active movement. With this active movement can help muscles to develop muscle and muscle ability capable of functioning optimally[8]. In addition, with this exercise can increase the ability of muscles to return to perform functional activities. To produce an adaptation of increased mobility requires 12-18 practice times[9].

Motor control exercise can provide a change in lumbar functional ability in non-specific LBP patients by involving the form of exercise by contracting the inner trunk muscles, further integration of these muscles such as static, dynamic, and functional exercise becomes more complex. This exercise also involves optimal coordination and control of the global muscles of the trunk[10].

Based on previous research, MCE will provide changes to the stability and control of the spine in LBP patients. During the intervention, patients were taught how to contract the trunk muscles in a way that is specifically developed until the patient is able to maintain contraction of the muscles while breathing normally. The follow-up phase of this exercise involves giving exercises to develop functional activity skills. Beginning with static activity is then extended to more dynamic and more complex activities. During this exercise process, the muscles in the trunk, posture, and patterns of motion and respiration of the patient are also better[7].

According to some studies also showed that increased activity and co-activity of spinal antagonist muscle can improve spinal control in LBP patients. In general, this opinion encourages maintenance from a stable lumbopelvic position. Spinal stability and control depend not only on muscle but also on the Central Nervous System (CNS) which will define planning and execution to maintain spinal stability[6].

Motor Control Exercise will improve the performance of deep trunk muscle. With the occurrence of a coordinated contraction of the muscle will result in reduced intradiscal pressure and will reduce the workload of the lumbar muscle, so the tissue is not easily injured and the lumbar muscle tension is reduced[10]. With the occurrence of muscle relaxation is expected to occur muscle pump repairs that resulted in increased blood circulation in the tissue of back muscle. Thus, the supply of food and oxygen in the muscle tissue becomes better, the pain caused by spasm will decrease. Deactivation of deep trunk muscle will cause the muscle components that play a role in performing the lumbar extension (multifidus) movements become more relaxed to obtain the increase significant in lumbar extension motion ROM[7].

The exercise effect of MCE will develop the working of dynamic muscular corset muscles. With the occurrence of a coordinated and simultaneous contraction of these muscles will provide a rigidity to support the trunk. As a result, intradiscal pressure is reduced and the workload of abnormal lumbar muscle is reduced as well. Muscle relaxation is expected to occur due to muscle pump repair which resulted in improving blood circulation in the back muscle. Thus, the food and oxygen supply in muscle tissue becomes better, so the pain caused by spasm will decrease[6].

In addition, activation of the core muscle that acts as a spinal stabilizer muscle will make the global trunk muscle that had been spasm to relax, thus also obtained good spine stability and spinal position in a neutral state. With good spine stability, one will be easier in performing a functional activity. In addition, the reduced intradiscal pressure will make non-specific LBP sufferers more easily perform functional activities, such as lifting, walking, sitting, standing and during recreational activities[10].

Not only in the deep trunk muscle, MCE can also create a global muscle trunk that was once spasm relaxed, Global muscle (external obliques, rectus abdominis, and iliocostalis) plays a role in flexion movement, lateral flexion, and lumbar rotation becomes more relax, so the limitation of lumbar ROM becomes reduced. Thus, an improved lumbar ROM and good spine stability and spinal position are neutral. This is consistent with the theory put forward by Kisner (2012) that with good spine stability in a person it is easier to perform activities without the limitations of motion[9].

The authors concluded that Motor Control Exercise was significant in providing changes functional ability of the lumbar joints 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.

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