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## **GRT** EFFECT OF MOTOR CONTROL EXERCISES ON PAIN, FUNCTIONAL DISABILITY, AND FEAR OF MOVEMENT IN MECHANICAL LOW BACK PAIN - AN RANDOMISED CONTROL TRIAL

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**Abstract:**-Low back pain is the most common musculoskeletal symptoms seen in 85 % of individuals in their life time. Pain arises without any inflammatory signs or traumatic signs termed as mechanical back pain. Though there are various means of management for the back pain, still no means proved efficient. Motor control exercises concentrate on segmental stabilization which works to prevent and treat the causative factor of mechanical back pain. This study focused to find out the motor control exercises on pain, functional disability and kinesiophobia in mechanical low back pain. Randomized control trial with 42 patients with mechanical low back pain were selected and assigned into two groups. 21 subjects in experimental group as Motor control exercises with back care advices whereas 21 subjects in control group with general back exercises with back care advices. Both groups were assessed for 8 weeks of duration. Following that the subjects pain scale, functional disability and kinesiophobia were analyzed using VAS, Oswestry disability index and Tampa scale of kinesiophobia. The values were analyzed using student 't' test and Anova. The result of the study shows that motor control exercises produces a significant change in pain, functional disability and kinesiophobia in mechanical low back pain.

**Keywords:** Motor control exercises, Mechanical low back pain, Back exercises, Visual analog scale, Fear of movement, Tampa scale of kinesiophobia, Oswestry disability index.

### **INTRODUCTION**

India has got lot of concern on back pain since there is a rapid increase of patients with low back pain. Research states that nearly 60% of individuals in India having some point of life time which are come into notice, but there is significant chance of low back pain go for unnoticed. (Foster et al., 1999). Low back pain is the commonest health condition affecting 70%—80% of world population. (Frank et al., 1996).

Low back pain is self limiting which result in economical, personal and social burden to the individual as well as the community. The work absence because of low back pain is much in the world. (Walker et al., 2003, Lidgren et al., 2003). Most of the cases of low back pain has no identifiable cause. Sometime though the imaging procedures shows osteophyte changes in the spine still it is not appropriate cause for the low back pain which is termed as non specific low back pain or mechanical low back pain. (Deyo et al., 2002, Batt et al., 2000, Chaudry et al., 2004).

Various research and systematic studies described various treatment interventions in the management of low back pain. Physiotherapy is commonly prescribed in the management of low back pain. Modalities play a role in reduction of low back pain, still their effectiveness are questionable. Exercises play as a major intervention in reduction of low back pain. Various research supports role of exercise in the management of low back pain.

Motor control exercises or core stability muscle strengthening are recently used in the management of low back pain. Segmental stabilization exercises were first described by Richardson et al., 1995. The process of the stabilization exercises are by stimulating the core muscles with learning precise co-contraction patterns of two muscles lumbar multifidus and transversus abdominis. Researchers found that these exercises will help in reducing the low back pain and prevent the further episode of it. (Richardson et al., 1995). Bergmark, (1989), identified as two groups of muscles “stabilizers” and “mobilizers” (i.e) Global muscles and the local muscles. The global muscles are more of mobile where as the local muscle stabilizes.

Richardson and Jull in 1995, explained the role of internal muscle strengthening by the segmental stabilization exercises. This not only strengthens and stabilizes the spine but also reduces the occurrence of re injury. (Hodges et al., 1996, O'Sullivan et al., 1998, Hides et al., 1996).

Motor control exercises utilize the basic principles of motor learning to train and retrain the trunk muscles, maintain posture, and improves movement pattern. When these actions were improved by the strengthening then the injury rate was reduced and also reduction of pain and disability. (Hodges et al., 2007).

Global strengthening or general strengthening exercises are designed to strengthen the mobility muscles which prevents low back pain, these exercises are often conducted as a group therapy or individualized training. (Hayden et al., 2005, Klaber Moffett et al., 2008).

Back care education programme is an appropriate intervention in the management of low back pain by understanding the basic knowledge on musculoskeletal system as well as the basic pathology and the prevention methods. Understanding the proper prevention methods and the life style adaptations, help in reduction of recurrence of low back pain. (Twomey 1992).

However, there is lack of evidence concerning the effectiveness of segmental stabilizing exercises and the general exercises. Therefore, the objective of this study is to evaluate the effect of motor control exercises on pain, functional disability and fear of movement in mechanical low back pain. The study was hypothesized that there is no difference obtained following global exercises or motor control exercises in mechanical low back pain.

#### **METHODOLOGY:**

Randomized control trial, which includes 42 subjects with low back pain were selected using a simple random sampling method. The subjects were instructed clearly on the study, the potential benefits and harms of the study was adequately explained to the subjects, they were given 24 hrs to confirm their participation, their willingness to participate was obtained and the subjects had permitted to withdraw from study at any point of time. There was no reimbursement given to the subjects, either in the form of money or treatment. Informed consent was obtained from all the participants and the study was approved by the institutional ethical committee. Participants in the study were randomly allocated by sealed envelope method, a total of 42 envelopes will be prepared by the research assistant who is not in the part of the study, 21 containing an identifier for motor control exercises and 21 contain identifier for General exercise training, will be shuffled before giving to the participants. The allocation of participants to treatment will be determined by the order of the shuffled envelopes. The study included the subjects with Low back pain not more than 5 in Visual analog scale (Moderate pain level), age group from 25 yrs to 45 yrs, Both sex were included, pain with more than 3 months of duration, patient doing normal ADL activity, working population (since they do their routine activity), BMI within normal limit, Not taking part in any of the research studies and not taking physiotherapy for the past 2 months of duration (to avoid the carry over effect) and No psychological or yellow flag subjects whereas subjects with Intervertebral disc prolapsed, radiating pain, stenosis, severe spondylosis and spondylolesthesis, cardiovascular problems, not optimal for exercises and psychologically unstable patients were excluded from the study. The selected subjects were assessed by the medical person followed by two senior therapist assessed and recommended to include in the study. The two therapist (Assessor) role was to assess and reassess the patient; they don't know which patient was recruited in which group. The study was carried out for 8 weeks of duration for an individual subject where as whole study was carried out for 8 months. The follow up was made at the 3rd month, 6th months and 8th month.

Before starting the study all the patients were given with a back care book, in which self explanatory anatomy, causes of back pain, self treatment measures, good posture and bad posture with pictures and what to do and what not to do were given clearly. The explanation was given by one therapist on one to one basis. The queries were clarified at the time of discussion. A computer generated random sampling was used to allocate the patients, either in control group or experimental group. Control group subjects received general back exercises were given for 30 mins, 10 mins of stretch were given and 5 mins of cool down was advised. The back exercises includes pelvic bridging, prone pushup, prone straight leg raise, prone cobra, and prone arm rise (unilateral initially and bilateral later). Experimental group underwent motor control exercises for 30 mins with 10 mins of stretches and 5 mins of cool down. The motor control exercises include abdominal tucking in supine, sitting, trunk twist in supine lying, pelvic bridging, and abdominal contraction with marching. Stretches includes the Gluteus, Hip flexors, Quadriceps and Hamstrings. The parameters chosen were pain, functional disability and kinesiophobia which were assessed by using visual analog scale, Oswestry disability index and Tampa scale of fear of movement.

#### **RESULT & DISCUSSION**

The measurement was taken in the first visit, 3rd week, 6th week and 8th week, for the analysis it was chosen first visit, 3rd week and 8th week were chosen. The analysis was done using Analysis of variance and Mann Whitney U test was done to find out the significant effect of exercises. Follow up analysis were not mentioned whereas it was shown in the graphical representation.

Mann Whitney U test was used to analyze the experimental group and the control group. In this study the post test data was taken for the analysis and the result found that there was significant improvement in the experimental group than the control group.

The demographic data was analyzed and mentioned in the table I and the figure is in the graph I. the demographic

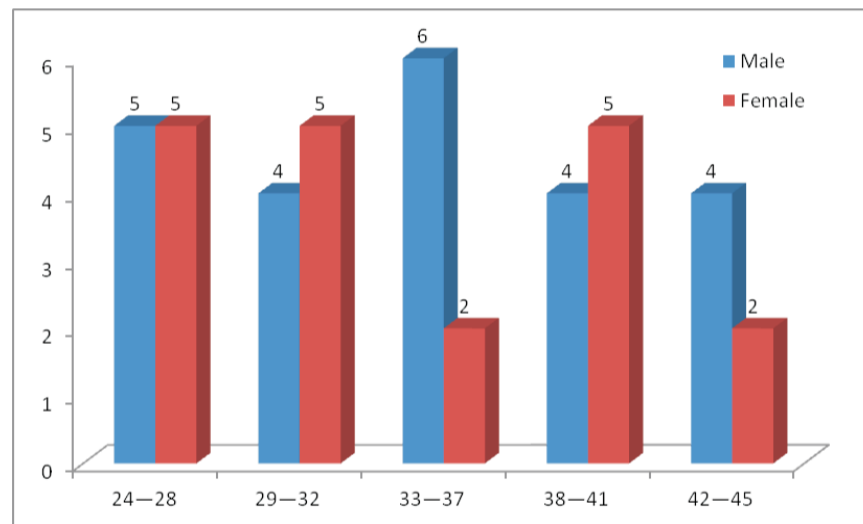
value shows the mean age of the participants were 34.26 yrs and there are 23 male subjects and 19 female subjects were participated in the study. The total of 42 subjects data was taken for the analysis though it was 45 selected since 3 of the participants withdraw from the experimental group since their symptoms increases.

**DEMOGRAPHIC DATA**

**Table I**

Sex	24—28	29—32	33—37	38—41	42—45	Mean	S.D
<b>Male</b>	5	4	6	4	4	34.26	6.43
<b>Female</b>	5	5	2	5	2	33.31	6.15
<b>Total</b>	10	9	8	9	6	33.83	6.25

**Graph I**



The pain value was assessed through the Visual analog scale, their S.D was 39.754 and the Z score is 4.968 which were lesser than the table value of 142. So it supports that there was a significant difference between the two groups and the experimental group shows significant improvement than the control group. There was a greater reduction of pain in experimental group than the control group. It was shown in table II and the graphical representation in figure II

The functional disability was assessed through the Oswestry disability index, the S.D was 39.754 and the Z score is 5.484 which were lesser than the table value of 142. So it supports that there was a significant difference between the two groups and the experimental group shows significant improvement than the control group. There was a greater reduction of disability in experimental group than the control group. It was shown in table III and the graphical II

The fear of movement was assessed through the tampa scale of kinesiophobia, the S.D was 39.754 and the Z score is 5.5343 which were lesser than the table value of 142. So it supports that there was a significant difference between the two groups and the experimental group shows significant improvement than the control group. There was a greater reduction of fear of movement in experimental group than the control group. It was shown in table IV and the graphical representation in graph II.

**PAIN (Post vs Post)**

**Table II**

	No of Subject	Mean Rank	Sum of Rank	S.D	Z score
Group A	21	30.93	649.5	39.7524	4.9683*
Group B	21	12.07	253.5		
Total	42	21.5	903		

\* (Critical value is 142)

**ODI (Post vs Post)**

**Table III**

	No of Subject	Mean Rank	Sum of Rank	S.D	Z score
Group A	21	31.9	670	39.7524	5.484*
Group B	21	11.1	233		
Total	42	21.5	903		

\* (Critical value is 142)

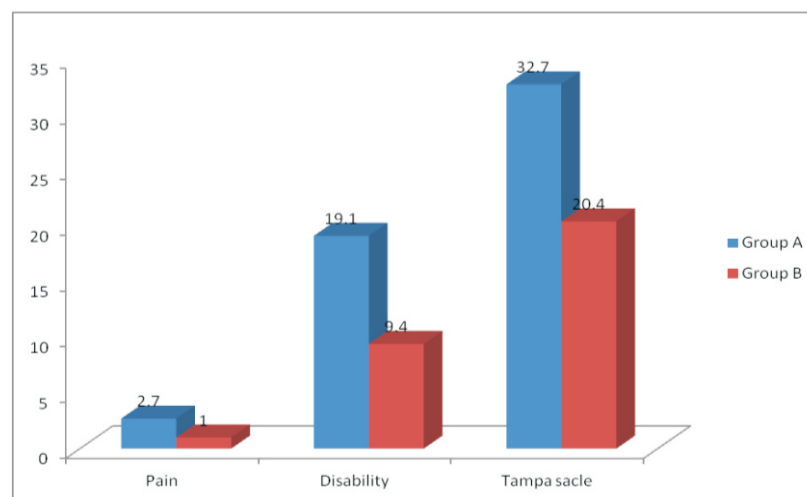
**FABQ (Post vs Post)**

**Table IV**

	No of Subject	Mean Rank	Sum of Rank	S.D	Z score
Group A	21	32	672	39.7524	5.5343*
Group B	21	11	231		
Total	42	21.5	903		

\* (Critical value is 142)

**Graph II**

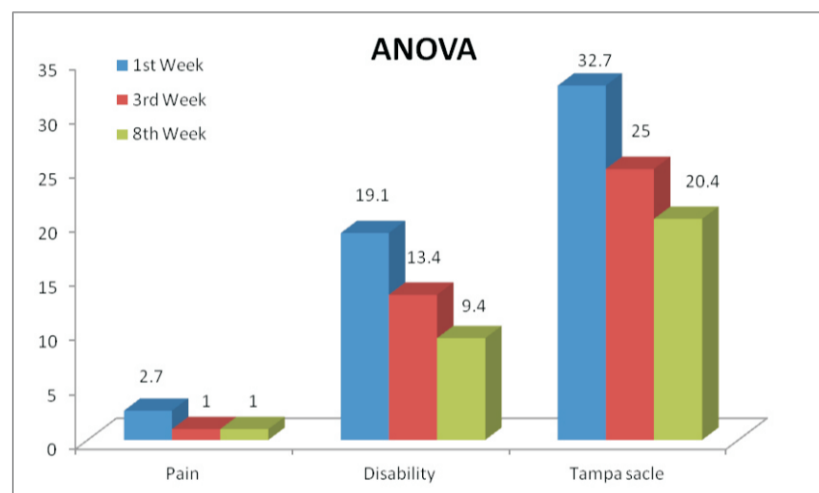


One way Anova was used to analyze the differences between the first week, 3rd week and the 8th week of treatment, mentioned in Table V and the figure in Graph III.

**Table V**

Source of Variation	Sum of Squares	d.f	Mean Squares	F
Between	3987	2	1993	762.5
Errors	156.9	60	2.614	
Total	4143	62		

**Graph III**



Low back pain is a common health problem due to its high impact on disability and health care costs. Though there are many researches related to low back pain the cause of it was not well understood. One of the hypothesis states that the psychology of the person following an acute episode of back pain may be the cause for recurrent back pain. The mental attitude of the person with low back pain cause lot of beliefs about pain and this is an important cause for increase in risk factors. (Picavet et al., 1997, Badley et al., 1994, Meerding et al., 1998, Hoogendoorn et al., 1999, 2001)

Stabilization exercises to the lumbar spine helps in improvement of pain, disability and kinesiophobia was explained by shakeri in 2013, this study strongly support the application of motor control exercise on reduction of the symptoms. Intense physical exercises help in reducing the fear of movement in chronic low back pain. (Kernan et al., 2007). Exercises give a gross decrease in disability as well as shown positive changes in other factors like psychological factor (Activity related fear, self confidence in performance and control over pain). ( Mannion ,2001, Woby 2004, Strong1995).

Back book plays a major role in reducing the fear avoidance behaviors and showed the effect of exercise on patient belief and outcomes. Educational message on low back pain focuses on avoiding the negative orientation towards pain and fear of movement. Some authors have found a patient educational booklet to give noticeable improvement in pain during the treatment of CLBP. (Raiville.et al., 1995, Norris et al., 2008).

General trunk exercises advised for low back pain activates the abdominal muscles and the paraspinal muscles, these exercises help in reducing the symptoms. This was supported by various clinical trials. But the negative points of these exercises are these exercises are not focusing on the particular group of muscles whereas it focuses on group muscles. In recent times there was increasing concentration on focusing of the local stabilizing muscles in the spine, and various studies shows that it was producing significant benefit than the traditional method. (McGill, 1998, Arokoski 1999, Kellett et al., 1991, Hansen et al., 1993, Risch et al., 1993).

Exercises give a gross decrease in disability as well as shown positive changes in other factors like psychological factor (Activity related fear, self confidence in performance and control over pain). Danneels in 2001, stated that the stabilization exercises when compared with general exercises in non specific low back pain shows a positive results in improvement of cross sectional area of multifidus. The mode of action of the multifidus on improvement of the cross sectional area and alleviating the low back pain was still in debate. Hides et al., 1996, O'Sullivan et al., 1997).

This study tested the hypothesis of no difference obtained following application of motor control exercises and general back exercises, but based on the findings it shows that there are significant difference between the groups underwent motor control exercises and the general exercises, so this study rejects the null hypothesis. Thus the study concludes that the

motor control exercise splay a major role in reducing the pain, functional disability and fear of movement in mechanical low back pain. Poor follow up of the participants and the withdrawal of the patients from the study, no strict protocols are major limitations found here.

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