Effect of Core Stabilization Combined with Mckenzie Exercises in Housekeepers with Mechanical Low Back Pain

Siddhida Madki[1], Smrutika Shinde[2]
[1]*Under Graduate Student/ D Y Patil College of Physiotherapy, Kolhapur, India*
[2]*Assistant Professor/ D Y Patil College of Physiotherapy, Kolhapur, India*

Abstract- Introduction- Housekeeping requires a lot of physical effort that requires forceful motions and working in improper body positions which leads to Mechanical low back pain. One of the most beneficial techniques for conservative spine care and low back pain is the McKenzie Techniques. A different strategy which is becoming more popular and beneficial for treating Mechanical low back pain is Core stabilization exercises. Methodology-68 housekeepers were recruited in the study and were randomly divided into two groups, with 34 housekeepers in each group. GROUP A (Control Group) housekeepers received Hot Moist Pack for lumbar region for 10 minutes followed by Core Stabilization exercises. GROUP B (Experimental group) housekeepers received Hot Moist Pack for lumbar region for 10 minutes followed by Core stabilization and McKenzie Exercises. Statistical analysis was recorded and the results were obtained. Result- In Intra Group comparison of Numeric Pain Rating Scale (NPRS) the p value of Control group is 6.11E-18 and Experimental group is 4.03E-21, which is < 0.05 considered as significant. In Intra Group comparison of MMST Lumbar Flexion the p value of Control group is 1.11E-17 and Experimental group is 1.49E-21, which is < 0.05 considered as significant. In Intra Group comparison of MMST Lumbar Extension the p value of Control group is 9.55E-22 and Experimental group is 3.09E-18, which is < 0.05 considered as significant. In Intra Group comparison of MODI The p value of Control group is 2.98E-23 and Experimental group is 5.50E-28, which is < 0.05 considered as significant.
Conclusion- Both the groups showed significant improvement however group B was more significant in reducing pain, improving lumbar flexion-extension ROM and reducing disability and improving function in Housekeepers with Mechanical Low Back Pain.

Keywords-Core stabilization, McKenzie exercises, Numeric Pain Rating scale, Modified-Modified Schober's Test.

INTRODUCTION

Pain in the region that's confined between the lowest rib and buttock crease is referred to as low back pain. A low back ache is pain in the lower segment of the spinal column.(1) The majority of the population suffers from Low Back Pain which is a prevalent Musculoskeletal condition.(2) As a primary contributor to disability and a factor in both Quality of Life and productivity at work, Mechanical Low Back Pain affects the both.(3) Mechanical pain arises when the joint between two bones is positioned in an orientation that stretches the surrounding ligaments and soft tissues.(4) Mechanical low back pain is linked with clinical instability and discomfort in lumbar motion segments. Mechanical Low back pain causes alterations in these systems. Gordon Waddell's criteria for mechanical low back pain are as follows: the pain is typically episodic, stiffness or pain is common in the morning, the pain is felt during forward flexion and frequently when returning to an erect position, the pain is often produced or aggravated by flexion, extension, lateral flexion, rotation, standing, walking, sitting, and exercises, the pain usually gets worse during the day, changing positions, especially when lying down or in a flexed posture, and the pain usually lasts for more than a day. (3)

Housekeeping requires a lot of physical effort that requires forceful motions and working in improper body positions when lifting mattresses, scrubbing tiles and vacuuming in every shift which ultimately results in Low Back Pain. Workplace exposure to ergonomic stressors, uplifting and moving heavy goods, improper poor body posture, repeated movements, static workload have all been identified as a key risk factor for Mechanical Low Back Pain. (5) Housekeeping

departments perform an important role in hospitals, colleges, and hotels in order to maintain a clean health care environment. Housekeeping departments are often involved in physically active professions and undertake a variety of actions such as walking, frequent forward bending, twisting motions of the trunk, stooping, crouching, and kneeling.(6)

Exercise Therapy has been found to be more successful in addressing low back pain. One of the most beneficial techniques for conservative spine care and low back pain is the McKenzie Techniques. It is a therapeutic approach based on the movement patterns of the spine. A different strategy which is becoming more popular and beneficial for treating Mechanical low back pain is Core stabilization exercises.(2)

Core stabilization exercises promote co-contraction between abdominals and back extensors to preserve spinal stability, evenly distribute loads, and increase functional activity. Core stability training seeks to activate the trunk muscles and improve lumbar spine control during dynamic activities.(1) The aim of core stability exercises is to enhance lumbopelvic and abdominal control through a variety of training programs using distinct techniques. These exercises are directed to improve the ability of the neuromuscular and motor control systems to prevent spinal injury. Conventional back care exercises assist in minimizing pain and strengthen the affected muscles, but they only last about a year, leaving patients with some residual pain and impairment and increasing the likelihood of recurrence. Core stability exercises are a popular therapeutic exercise for restoring appropriate kinetic function.(7) The McKenzie back exercises are a part of an exercise program that was developed in the 1950s by physiotherapist Robin Anthony McKenzie and became widely recognized in 1985.Several musculoskeletal disorders, such as lower back, neck, and extremities pain, can be diagnosed and treated using the McKenzie approach, also referred to as Mechanical Diagnosis and Therapy (MDT). It places a strong emphasis on self-treatment through posture alignment and high-frequency, end-range exercises motions. The McKenzie method of treating back pain is characterized by its ability to identify and categorize nonspecific spinal pain into uniform categories.(8)

On the effects of Core stabilization and McKenzie Exercises, numerous independent and comparative studies have been carried out. While both techniques have been shown to be effective in reducing pain and improving functional disability, their combined effect has not been extensively studied. Hence, the above study was conducted to evaluate the combined effect of Core stabilization and McKenzie Exercises on Pain, Range of motion and function in Housekeepers with Mechanical Low Back pain and also to prevent any further spine related musculoskeletal conditions and complications.

MATERIALS AND METHODS

The interventional study was carried out from October 2023 to March 2024 .Ethical approval was obtained from Institutional Ethical Committee and Protocol Committee of D. Y. Patil Education Society, Kolhapur and D. Y. Patil College of Physiotherapy, Kolhapur.

68 participants were included based on the inclusion and exclusion criteria.

Inclusion Criteria- Housekeepers aged between 25-45 years, belonging to both the genders, with history of mechanical low back pain since 3-4 months, with 6-8 hours of work and with 2-3 years of work experience.

Exclusion Criteria- Subjects with lumbar vertebral body fractures, infections like TB, any recent spinal surgery, spinal structural deformity and arthritic diseases.

68 housekeepers who were selected for the above study were further divided into two groups, with 34 housekeepers in each group. Group A (Control group) and Group B (Experimental group). GROUP A (Control Group) housekeepers received Hot Moist Pack for lumbar region for 10 minutes followed by Core Stabilization exercises. GROUP B (Experimental group) housekeepers received Hot Moist Pack for lumbar region for 10 minutes followed by Core stabilization and McKenzie Exercises. The intervention was given for 3 times/week for 4 weeks. Each session lasted for 25 minutes. Demographic data details like age, gender, occupation as per the data collection sheet were collected. Pre and post-Intervention Outcome measures were assessed by using NPRS, Modified-Modified Schober's Test and Modified Oswestry Low Back Pain Disability Questionnaire. Post-intervention data was recorded on the next day of termination of the study. Statistical analysis was recorded and the results were obtained. Data was entered into the MS Excel 2016, tabulated and statistically analysed.

Exercise Protocol for Group A (Control Group)

Hot moist pack was applied to the lumbar region for 10 minutes. Followed by this Core Stabilization Exercises were given. For every subject, three sets of ten repetitions were performed. After the current exercise was completed satisfactorily, the exercises were advanced.

The first two weeks of the intervention included the following core stabilization exercises: Abdomen Hollowing, Supine Bridging, Unilateral Leg Extension, Cat and Camel, and Dead Bug Exercise. For the next two weeks, new exercises like unilateral leg extensions in bringing, bilateral leg extensions in prone and bird dog were given with the previous mentioned exercises.

Exercise protocol for Group B (Experimental Group)

Hot moist pack was applied to the lumbar region for 10 minutes. Followed by this Core Stabilization Exercises and McKenzie Exercises were given. Group B received the exact same Core stabilization exercises as Group A. McKenzie Exercises were given followed by the Core stabilization exercises. McKenzie Exercises such as Prone Lying, Prone on Elbows, Prone Press Ups, Extension in Standing, Flexion in supine lying, Flexion in sitting and standing were performed by the participants. For every subject, three sets of ten repetitions were performed.

After the current exercise was completed satisfactorily, the exercises were advanced.

Figure 1 Unilateral Leg Extension

Figure 2. Bird Dog Exercise

Figure 3. Prone on Elbows

Figure 4. Prone Press Ups

Figure 5. Flexion in supine lying

RESULT

Outcome Measures	Groups	Time point	Mean	SD	P value
NPRS	Control	Pre	5.35	0.92	6.11E-18
		Post	3.91	0.87	
	Experimental	Pre	5.03	0.76	4.03E-21
		Post	1.82	0.83	

Table No. 1 Intra Group comparison of Numeric Pain Rating Scale (NPRS) in Control and Experimental Group.

The pre and post mean of Control group was 5.35 and 3.91 respectively. Pre and post standard deviation were 0.92 and 0.87. The pre and post mean of Experimental group was 5.03 and 1.82 respectively. Pre and post standard deviation were 0.76 and 0.83. Statistical analysis was done using paired t-test. The p value of Control group was 6.11E-18 and Experimental group was 4.03E-21, which is < 0.05 considered as significant.

Table No. 2 Intra Group comparison of MMST Lumbar Flexion in Control and Experimental Group.

Outcome Measures	Groups	Time point	Mean	SD	P value
MMST Lumbar Flexion	Control	Pre	3.18	0.58	1.11E-17
		Post	4.56	0.56	
	Experimental	Pre	3.53	0.61	1.49E-21
		Post	5.59	0.61	

The pre and post mean of Control group was 3.18 and 4.56 respectively. Pre and post standard deviation were 0.58 and 0.56.

The pre and post mean of Experimental group was 3.53 and 5.59 respectively. Pre and post standard deviation were 0.61 and 0.61. Statistical analysis was done using paired t-test.

The p value of Control group is 1.11E-17 and Experimental group was 1.49E-21, which is < 0.05 considered as significant.

Table No. 3 Intra Group comparison of MMST Lumbar Extension in Control and Experimental Group.

Outcome Measures	Groups	Time point	Mean	SD	P value
MMST Lumbar Extension	Control	Pre	1.21	0.21	9.55E-22
		Post	2.24	0.20	
	Experimental	Pre	1.39	0.37	3.09E-18
		Post	2.70	0.35	

The pre and post mean of Control group is 1.21 and 2.24 respectively. Pre and post standard deviation are 0.21 and 0.20.

The pre and post mean of Experimental group is 1.39 and 2.70 respectively. Pre and post standard deviation are 0.37 and 0.35. Statistical analysis was done using paired t-test.

The p value of Control group is 9.55E-22 and Experimental group is 3.09E-18, which is < 0.05 considered as significant.

Table No. 4 Intra Group comparison of MODI in Control and Experimental Group.

Outcome Measures	Groups	Time point	Mean	SD	P value
MODI	Control	Pre	21.79	1.93	2.98E-23
		Post	17.74	1.60	
	Experimental	Pre	19.32	2.40	5.50E-28
		Post	12.71	1.83	

The pre and post mean of Control group is 21.79 and 17.74 respectively. Pre and post standard deviation are 1.93 and 1.60. The pre and post mean of Experimental group is 19.32 and 12.71 respectively. Pre and post standard deviation are 2.40 and 1.83. Statistical analysis was done using paired t-test. The p value of Control group is 2.98E-23 and Experimental group is 5.50E-28, which is < 0.05 considered as significant.

The post session difference of Numeric Pain Rating Scale, Modified -Modified Schober's Test for Lumbar Flexion and Extension and Modified Oswestry Disability Index of subjects of both the groups with mean and standard deviation was analysed statistically tested by unpaired t-test.

Table No. 5 Post mean and standard deviation of Numeric Pain Rating Scale of Control and Experimental group.

Outcome Measures	Group	Mean	SD	P value
NPRS	Control	3.91	0.87	2.24E-15
	Experimental	1.82	0.83	

The post mean and standard deviation of Control group is 3.91 and 0.87 respectively. The post mean and standard deviation of Experimental group is 1.82 and 0.83 respectively.

Statistical analysis was done using unpaired t-test. The p value is 2.24E-15, which is < 0.05 considered as significant.

Table No. 6 Post mean and standard deviation of MMST Lumbar Flexion of Control and Experimental group.

Outcome Measures	Group	Mean	SD	P value
MMST Lumbar Flexion	Control	4.56	0.56	2.90E-10
	Experimental	5.59	0.61	

The post mean and standard deviation of Control group is 4.56 and 0.56 respectively. The post mean and standard deviation of Experimental group is 5.59 and 0.61 respectively.

Statistical analysis was done using unpaired t-test. The p value is 2.90E-10, which is < 0.05 considered as significant.

Table No.7 Post mean and standard deviation of MMST Lumbar Extension of Control and Experimental group.

Outcome Measures	Group	Mean	SD	P value
MMST Lumbar Extension	Control	2.24	0.2	5.44E-09
	Experimental	2.7	0.35	

The post mean and standard deviation of Control group is 2.24 and 0.2 respectively. The post mean and standard deviation of Experimental group is 2.7 and 0.35 respectively.

Statistical analysis was done using unpaired t-test. The p value is 5.44E-09, which is < 0.05 considered as significant.

Table No.8 Post mean and standard deviation of MODI of Control and Experimental group.

Outcome Measures	Group	Mean	SD	P value
MODI	Control	17.74	1.6	1.29E-18
	Experimental	12.71	1.83	

The post mean and standard deviation of Control group is 17.74 and 1.6 respectively. The post mean and standard deviation of Experimental group is 12.71 and 1.83 respectively.
Statistical analysis was done using unpaired t-test.
The p value is 1.29E-18, which is < 0.05considered as significant.

DISCUSSION

The age range of the housekeepers in the above study was 25-45 years old, which is similar to the studies done by Swapnila Parmar et.al (2017) [9] and Sintayehu Daba Wami et.al [5] indicated that this age group was more prone to Mechanical low back pain.
The pre-session mean values of the Group A (Control Group) for NPRS, MMST Lumbar flexion, MMST Lumbar extension and Modified Oswestry Disability Index were 5.35, 3.18, 1.21 and 21.79 respectively. The Housekeepers in Group A (Control Group) showed improvement in NPRS score with a post session mean of 3.91, MMST lumbar flexion and Extension with a post session mean of 4.56 and 2.24 and in MODI with a post session mean of 17.74 when compared with their pre session values.

The pre-session mean values of the Group B (Experimental Group) for NPRS, MMST Lumbar flexion, MMST Lumbar extension and Modified Oswestry Disability Index were 5.03, 3.53, 1.39 and 19.32 respectively. The Housekeepers in Group B (Experimental Group) also showed improvement in NPRS score with a post session mean of 1.82, MMST lumbar flexion and Extension with a post session mean of 5.59 and 2.70 and in MODI with a post session mean of 12.71 when compared with their pre session values.

Both Group A and Group B showed significant improvement in pain reduction when comparing the post-session NPRS mean values; however, Group B showed greater improvement than Group A. On comparison between Group A and Group B on MMST Lumbar flexion post session mean values both the groups showed significant improvement in Lumbar flexion ROM. However, Group B showed better improvement than Group A. When the post session mean values of MMST Lumbar extension values were compared between Group A and Group B, both groups exhibited significant improvement in Lumbar extension ROM, but Group B improved slightly more than Group A.

When comparing Group A and Group B on the post session MODI mean values, both groups exhibited a significant improvement, however Group B improved more than Group A in reducing disability and improving function.

Possible reasons for these improvements in the experimental group, which was supported by previous study done by Arsalan Ghorbanpour, showing that core stabilization exercises restore normal lumbar muscle coordination and stability [(10)]. According to the study done by Suresh Reddy, a "girdle" of protection for the low back is created by core stabilization, which places emphasis on the trunk muscles and improves flexibility and co-ordination.[(1)] According to Punjabi's hypothesis the maintenance of lumbar stability during functional activities is facilitated by the contraction of segmental muscles and the synchronization of major trunk and small intrinsic muscles. Hence, core stabilization exercises are designed to strengthen the function of the local muscles to improve segmental stability. Previous study done by Suresh Reddy found that Core stabilization exercises is more effective in reducing Mechanical low back pain, improving ROM and reducing disability than conventional exercises.[(1)]

In addition to this according to the study done by M. B. Dohnert, McKenzie's technique may involve activating pain gate control mechanisms or promoting relaxation and decompression of neural tissues.[(11)] The previous study done by Rajani Cartor M found that, in the short term, there is a significant reduction of pain in mechanical low back pain patients who received McKenzie's exercises compared to the ones who received traction.[(12)] According to the study done by Jyoti Sharma, McKenzie therapy significantly reduces disability and improves function when compared to other treatments.[(13)] Both the groups showed significant improvement but group B was more significant. The present study shows that there was significant improvement in Group B housekeepers who received HMP, Core stabilization and McKenzie exercises in reducing pain, lumbar flexion and extension ROM and reducing disability and improving functions in housekeepers with Mechanical low back pain.

CONCLUSION

From this study it was concluded that there was significant improvement in Group B (Experimental Group) Housekeepers due to the combined effect of Core stabilization and McKenzie Exercises in reducing pain, improving ROM of lumbar flexion-extension, reducing disability and improving function in Housekeepers with Mechanical Low Back Pain.

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