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ORIGINAL ARTICLE

Effect of Core Stability Exercises with Conventional Physiotherapy in Reducing Pain among Patients with Non-Specific Low Back Pain: RCT

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ABSTRACT

Low backache is common among urban society. It is one of the main reasons for activity limitation and absenteeism from work

Purpose: To compare role of swiss ball-based core stability exercise and conventional physiotherapy among patients of non-specific low backache in reducing pain and improving function

Study Design: Randomized clinical trial

Methodology: Current project was conducted at Ehsan Rehab Physiotherapy Clinic and Mumtaz Bukhtawar Trust Hospital, Lahore. Patients (n=74) aging between 25-50 years with nonspecific low backache were randomized into 2 groups. Thirty-seven patients were present in each of Group A and in Group B. Group A was treated with conventional physiotherapy treatment (Controlled Electrotherapy Treatment along with Conventional Exercises). Group B was treated with (Controlled Electrotherapy Treatment along with Core Stability Exercises on Swiss Ball). Oswestry disability index and numeric pain rating scale were used as outcome measuring tools

Statistical analysis: The collected data was analyzed by using SPSS version 25

Results: There was a large improvement in pain intensity and improvement in functional limitation in both groups. However, group B showed that there was a more substantial improvement in pain and functional disability

Conclusion: It was concluded that core stability based on Swiss ball exercises was more effective than conventional physiotherapy treatment in improving pain and function in patients of nonspecific low backache

Key Words: Core Stability, Swiss Ball Exercises, Physical Therapy, Electrotherapy and Backache.

INTRODUCTION

Chronic low backache is the common complaint occurring among most of the urban societies causing absenteeism from work and limits their activity. It is estimated that 70% - 80% of the population bears backache at one point in their lifetime[1]. The pain and discomfort confined to the area between glutei and 12th rib inferior border, with and without radiation to the leg, is considered as low backache. It is a feeling of discomfort in the lumbar region and may be associated with leg pain. 90% of cases of low backache are with the primary cause that is mechanical or nonspecific low backache. The rest of the cases present with secondary pain due to underlying pathology, and mechanical low backache commonly affect people between the ages of 30 to 50 years. Core stabilization is used for description of abdominal muscle training and exercises in lumbo-pelvic area. For sake of description, local and global system of muscles can be used. The global refers to system consisting of superficial area around lumbar and abdominal region, for example para-spinal and abdominis musculature, while local stability means intrinsic muscles of abs wall for example multifidus and transverse abdominis. These local muscles are important to provide stability at segmental level[2]. Core stability and motor control have been shown to be imperative for the initiation of functional limb movements. There are different types of core stability exercises that are performed on stable and unstable surfaces. On durable surfaces like a bed, these exercises can be completed in supine, side-lying and quadruped positions. These steady surface exercises are usually planned for patients with acute low backache. For chronic low backache, core stability exercise is performed on Swiss ball or gym ball, which are squatting, bridging with straight leg raising (SLR), bridging with heel dig, abdominal crunches, planks, side exercises and reverse crunch on the Swiss ball[3]. Core muscle exercises are common during training and fitness programs. Abdominal crunches are mainly designed to activate rectus abominis and oblique muscles. It is shown via recent studies that considerable muscle activity can be gained with abdominal exercise devices, including a Swiss ball. These exercises have numerous benefits like activating core muscles and maintain their stability and indirectly reduce backache and increase functional activities[2]. Conventional physiotherapy is the routine treatment of chronic low backache, which is commonly practiced by most of the local physical therapists. It includes electrotherapy modalities (ultrasound, TENS, interferential therapy, etc.), strengthening exercises, stretching, and some specific exercises for home plan[4]. The Swiss ball or gym ball is commonly used in the recreational training environment as a training device for balance control, core stability exercises, and muscle strengthening. However, there is not a lot of scientific

evidence to support the beneficial effects of core stability exercises using Swiss ball in patients with non-specific chronic low backache use. It is also not clear whether performing the exercises on the Swiss ball has a more significant benefit than performing the same exercise on a hard surface like a chair or bed in patients with nonspecific low backache[5].

OBJECTIVES

To compare role of swiss ball-based core stability exercise and conventional physiotherapy among patients of non-specific low backache in reducing pain and improving function.

MATERIAL AND METHOD

project was conducted at Ehsan Rehab Physiotherapy Clinic and Mumtaz Bukhtawar Trust Hospital, Lahore. Patients (n=158) aging between 25-50 years with nonspecific low backache were randomized into 2 groups. Thirty-seven patients were present in each of Group A and in Group B. Group A was treated with conventional physiotherapy treatment (Controlled Electrotherapy Treatment along with Conventional Exercises). Group B was treated with (Controlled Electrotherapy Treatment along with Core Stability Exercises on Swiss Ball). Patients in both groups received ultrasound therapy as preparatory modality having 1 MHz, continuous mode with an intensity of 1.5 W/cm2 for 7 minutes. Moist heat pack, in combination with TENS, was applied for 10 minutes. The wet heat pack was pre-immersed in a hydro collator having a set temperature of 60^{O}C and then wrapped in 6 layers of the towel before application to the patient. The number of towel layers was increased or decreased according to the patient's tolerance level. Comfy Combo TENS with following parameters; Mode = Burst, Numbers = 5HZ, Pulse Width = 150us, Output Intensity = 20-40mA (as tolerated by the patient).

Group A - Conventional Exercises

1. Back Press Exercises 1 set of 10 repetitions
2. Hip Adductor Isometrics Exercises 1 set of 10 repetitions
3. Bridging Exercise I set of 10 repetitions
4. Knee to Chest stretch exercise 1 set of 10 repetitions
5. Upper back extension in a prone lying position with hands on the couch.

Progression of this exercise includes a 4 weeks treatment, 5sessions per week for consecutive four weeks. During the first week, all patients performed 1 set of 10 repetitions for each exercise. During the second week, the number of repetitions was increased to 1 set of 15 repetitions of every exercise. During the third and fourth weeks, we increased the training routine to 1 set, 20 repetitions, and 25 repetitions, respectively[4].

Group B: Core Stability Exercises On Swiss Ball: A 4 weeks treatment program for Group-B consisted of a Numbers of 5 sessions per week for consecutive four weeks.

Sitting: The patients were seated on the swiss ball for 2 minutes with the spine in a neutral position, chin tucked in, eyes looking straight, arms hanging on sides and feet slightly apart. In Progression of this exercise, duration of exercises was increased to 3 minutes in the second week and up to 5 minutes in the third and fourth weeks, respectively.

Sitting March: While keeping the stable neutral position on siss ball, the patient flexed right hip, holding the position for 10seconds, then repeating the same with the left leg and performed three repetitions on each side. In progression of this exercise, the duration of exercises in each repetition was increased to fifteen seconds in the second week and up to 30 seconds in the third and fourth weeks, respectively.

Wall Squats: During wall squats, the patient held the swiss ball behind back in a standing position so that the ball was pinned between the back and the wall. While keeping the spine in a neutral position and in contact with ball and arms hanging on sides, feet shoulder-width apart, the patient flexed the knees to lower the body into a squatting position. The knees were flexed to 90 degrees or less as tolerated by the patient in maintaining the position. The 1 set of 3 repetitions was performed with each repetition position maintained for 10 seconds. In progression of exercise, the duration of exercises was increased to 15 seconds in the second week, 20 seconds in the third week, and up to 30 seconds in the fourth week, respectively.

Bridging: The patient in a supine lying position with knees extended, and both feet on the swiss ball and arms resting on sides. To perform bridging patient lifted the back until it became straight in line with the knees level. The position was maintained by the patient for the required time, then lowered down to starting position. 1 set of 3 repetitions was performed with each repetition position maintained for 10 seconds. In progression of this exercise, the duration of exercises for each repetition was increased to 15 seconds in the second week, 20 seconds in the third week, and up to 30 seconds fourth week, respectively.

Oswestry disability index and numeric pain rating scale were used as outcome measuring tools.

Statistical Analysis: Data were analyzed using SPSS version 25. Mean and SD was given for pain intensity score and ODI score. Paired sample t-test was used to compare the pre-treatment and post-treatment mean values of the pain intensity score and ODI score within each treatment group. An Independent sample t-test was used to compare the mean value of the pain intensity score and ODI score between study groups. A p-value ≤ 0.05 was taken as significant.

RESULTS

General parameters of enrolled patients were presented as frequency and percentage with their respective means **±** SD in

Table-1:

Parameters	Groups	Mean	SD
Age (years)	conventional	36.29	5.35
	Swiss ball	36.10	6.97
Height (cm)	conventional	160.63	10
	Swiss ball	163.45	9.54
NPRS Pre-treatment	conventional	7.1892	0.84452
	Swiss ball	7.5676	0.89878
NPRS Post-treatment	conventional	2.8108	0.73929
	Swiss ball	2.2432	0.68335

Pre-treatment as well as post-treatment mean value of pain intensity between groups was presented as mean ± SD with their p-values in table -2.

Table-2: Comparative of Pre/post scores NPRS across Groups

Study groups	NPRS Pre-treatment	NPRS Post-treatment	p-value [a]
Conventional	7.19 ± 0.84	2.81 ± 0.74	< 0.001*
Swiss Ball	7.57 ± 0.90	2.24 ± 0.68	< 0.001*
p-value [b]	0.066	0.001*	

[a] paired t test, [b] independent t test, *Statistically Significant

Pre-treatment as well as post-treatment mean value of ODI score between groups was presented as mean ± SD with their p-values in table-3.

Table-3: Comparative of Pre/post ODI score across Groups

Study groups	NPRS Pre-treatment	NPRS Post-treatment	p-value [a]
Conventional	37.3 ± 11.4	17.7 ± 6.7	< 0.001*
Swiss Ball	36.2 ±11.7	14.8 ± 5.9	< 0.001*
p-value [b]	0.682	0.052	

[a] paired t test, [b] independent t test, *Statistically Significant

DISCUSSION

Core stability is more important as its imbalance can cause abnormal biomechanics of the body and cause low backache. Weak core muscles can also cause pain in the lower back. Different studies conducted regarding the role of core stability exercises on the swiss ball and unstable surface and stable surface to improve core stability and decreasing pain and increasing functional disability. Various studies were conducted to add the role of core stability exercises on the swiss ball in LBP, but data was limited.

In this study results showed that there is a significant difference in means of NPRS and ODI at pre and post-treatment levels in each group. Results showed that swiss ball exercises had a more substantial effect on reducing pain and improving function. The paired sample t-test was used to compare within-group comparison; hence, pre and post-treatment pain and functional disability were improved in both groups, but in the swiss ball exercise group, three was a more significant improvement.

As literature showed a consistency with the findings of this study[6-8]. In 2015, kimjin young conducted a study to find out the impact of proprioceptive neuromuscular oriented facilitation, its patterns of integration and training on swiss ball for improvement in pain and balance of elderly patients with long lasting backache of chronic nature. The participants here were also randomly allocated in two group. The session of treatment was consisted of half hour with three times a week over 6 weeks. This study also concluded that core stability program with incorporating swiss ball and facilitation techniques performed better and improved balance in elderly patients suffering from chronic backache. Backache was improved in both groups[9].

In another literature, Rajan Balakrishnan et al conducted a study to compare outcomes of core stabilization exercise in different positions such on swiss ball in comparative to that of on floor. Main objectives were to minimize disability and pain. Total of 30 patients were included which were randomly allocated in two groups with group A were assigned core stability plan of exercise on swiss ball and patients in group B were assigned same set of core stabilization exercise on floor. The study concluded that swiss ball exercises were found to be better, however, when considering effect size of trial, floor exercises also showed good outcomes in within group analysis and overall function and impact on daily activities as perceived by patients were not very different[10,11].

Limitations: It was a single centre study and we did not perform genetic workup among patients in-order to find the genetic cause. There was less follow-up and it was carried out on small sample size.

CONCLUSION

It was concluded that core stability based on Swiss ball exercises was more effective than conventional physiotherapy treatment in improving pain and function in patients of nonspecific low backache.

Author's Contribution: SA&AJ: Conceptualized the study, analyzed the data, and formulated the initial draft.

AM&NG: Contributed to the histomorphological evaluation.

MS: Contributed to the analysis of data and proofread the draft.

WL: Contributed to data collection.

TL: Contributed to the proofreading the manuscript for intellectual content.

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