

# **A Comparative Study Between Balloon Blowing Exercise In 90/90 Hemibridge Position With Ball And Core Strengthening Exercises On Chronic Low Back Pain In Adults**

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Low Back Pain (LBP) is defined as pain, muscle tension, or stiffness localised below the costal margin and above the inferior gluteal folds, with or without leg pain (sciatica) <sup>[1]</sup>. The incidence of LBP in the general population is between 50% and 80%. The most common work-related risk factors are combination of incorrect movements and postures caused by inadequate working environments or poorly designed equipment, as well as the ways in which work is organized and performed. LBP is commonly observed among health care professionals, and many studies have explored the incidence of this condition in Physiotherapists, nurses, dentists, sonographers, and surgeons <sup>[2]</sup>.

Low back pain affects people of all ages, from children to the elderly, and is a very frequent reason for medical consultations. The 2010 Global Burden of Disease Study estimated that low back pain is among the top 10 diseases and injuries that account for the highest number of DALYs worldwide. The lifetime prevalence of non-specific (common) low back pain is estimated at 60% to 70% in industrialized countries (one-year prevalence 15% to 45%, adult incidence 5% per year). Prevalence increases and peaks between the ages of 35 and 55. As the world population ages, low back pain will increase substantially due to the deterioration of the intervertebral discs in older people. Low back pain is the leading cause of activity limitation and work absence throughout much of the world, imposing a high economic burden on individuals, families, communities, industry and governments <sup>[3]</sup>.

Low back pain is usually categorized in 3 subtypes: acute, sub-acute and chronic. The causes of back pain are degeneration of spine and discs, trunk stabilizers, jobs requiring repetitive heavy lifting, the use of machine tools and the operation of motor vehicles, excessive mechanical stress on the intervertebral disc, Cigarette smoking and tobacco consuming. Patient having chronic low back pain symptoms for more than 3months presented with decreased muscle strength, impaired motor control, and decreased co-ordination and postural control which interferes with functional activities of patients <sup>[4]</sup>.

The Hemi-bridge position with Ball and Balloon technique developed by the Postural Restoration Institute intended to help restore the Zone of Apposition (ZOA) and spine to a proper position in order to allow the diaphragm optimal ability to perform both its respiratory and postural roles. The balloon blowing exercise (BBE) technique is performed in supine with the feet on a wall, hips and knees at 90 degrees and a ball between the knees. This passive 90° hip and knee flexion position places the body in relative lumbar spine flexion, posterior pelvic tilt and rib internal rotation/depression which serves to optimize the ZOA and discourage lumbar extension/anterior pelvic tilt, paraspinal activity, and rib elevation/external rotation. When performed with active hamstring contraction, the paraspinals are further inhibited due to the caudal pull of the hamstrings on the pelvis which further encourages lumbar flexion. A ball between the knees encourages adductor muscle activation (via hip adduction and internal rotation position) and co-contraction of the pelvic floor muscles (Levator ani and Coccygeus) <sup>[5]</sup>.

Stability of the trunk play roles in the elderly and individuals with disabilities in maintaining an upright body posture and in helping to change positions when sitting, standing, and walking. In sports performances, core strength is also very important to improve body balance and postural control in movements such as landing and contact. Core muscles including the transverse abdominis, multifidus, diaphragm, and pelvic floor muscles are thought to contribute stability of the spine. Strength exercises for the abdominal muscles among student participants in experiments have been reported to increase stability of the lumbar spine. Core training excluding the diaphragm for elderly individuals can also improve balance ability. Strength exercises for these four muscles are therefore hypothesized to help improve balance ability during sitting without support. <sup>[6]</sup>.

Previously done studies have shown the effectiveness of Balloon Blowing Exercise in 90/90 Hemi-bridge position and Core Strengthening exercises in patients with Non-Specific Low back pain. The need of the

study is to compare the effects of Balloon Blowing exercises in 90/90 Hemi-bridge position and Core strengthening exercises in patients with Chronic Low back pain.

## I. Materials and Methods

**Study design:** Comparative study

**Duration of Study:** 4weeks

**Study Setting:** Department of Physiotherapy, Harsha Institute of Physiotherapy, Nelamangala.

**Sample size:** 30patients with Chronic Low back pain

### Inclusion Criteria:

1. Patients Chronic Low back pain
2. Age group between 20 to 30 years.
3. Pain in VAS between 5-8
4. Oswestry Low Back Disability Questionnaire scale score between 5-14
5. Duration of Symptoms more than 3months
6. Both Genders

### Exclusion criteria:

1. Low back pain with Pathology.
2. Acute and sub-acute Low Back Pain.
3. Low back pain with radiculopathy
4. Low back pain with Sensory motor loss in lower limb.
5. Recent Trauma and Surgery

### Outcome measure:

1. VAS
2. Oswestry Low Back Disability Questionnaire (ODI)

## II. Methodology

The study included 30 subjects with chronic low back pain. The informed consent was obtained from the subjects and they were selected as per the inclusion and exclusion criteria. The procedure was clearly explained to the subjects and they were divided into Experimental and Control group.

The 15 subjects in Experimental group are instructed to lie on the back with feet flat on a wall with hips and knees bent at a  $90^{\circ}$ . With one hand placed above the head and other one holding the Balloon, a ball of 4 inches in diameter is placed to hold in between the subject's knees. Subjects are instructed to inhale through nose and exhale through mouth into the balloon while doing posterior pelvic tilt so that the tailbone is raised slightly off the mat. Subjects are instructed to pause three seconds with tongue positioned on the roof of the mouth to prevent airflow out of the balloon. Without pinching the neck of the balloon and keeping the tongue on the roof of the mouth, inhale again through the nose. Slowly blow out as stabilize the balloon with his/her left hand. After the fourth breath in, pinch the balloon neck and remove it from his/her mouth. Let the air out of the balloon. Relax and repeat for 4 to 5 times.

The 15 subjects in Control group are instructed to perform a exercises for the transverse abdominis, multifidus, diaphragm, and pelvic floor muscles. For training the transverse abdominis and multifidus, a hand-knee bird dog exercise was performed for 10min  $\times$  10 sets. For the diaphragm, abdominal inspiratory exercises with a 3-kg weight resting on the abdomen was performed for 10 min. For pelvic floor muscles, an exercise requiring maximal contraction of the perineal muscles in a sitting position against a towel between the thighs was performed 15 times  $\times$  2 sets for 10min.

The exercise program for both the groups used in this study was conducted for 30 minutes a day, five times a week for four weeks

## III. STATISTICAL ANALYSIS

### UNPAIRED T-TEST

#### Between Group analysis VAS - Group A & B

	Mean	SD	t-value	p-value
Group A	6.93	0.70		

<b>Group B</b>	3.00	0.93	14.75	0.0001
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**Paired t-test:** The p-value of VAS is < 0.0001, considered extremely significant. The t-value of VAS is 14.75 with 14 degrees of freedom.

**Between Group analysis ODI - Group A & B**

	Mean	SD	t-value	p-value
<b>Group A</b>	14.00	4.57	4.508	<0.005
<b>Group B</b>	6.87	4.09		

**Paired t-test:** The p value of ODI is 0.005, significant. The value of ODI is 4.508 with 22 degrees of freedom

**IV. RESULT**

Statistical analysis using Paired ‘t’ test concluded that there was a significant decrease in pre to post values of Pain and Disability in both Balloon blowing exercise group and Core strengthening exercise group. Unpaired ‘t’ test has shown that there was a significant difference between the effect of Balloon blowing exercise and Core strengthening exercises alone in Chronic Low back pain.

In this study, Balloon blowing exercise group has shown significantly better improvement than Core strengthening exercise group alone. The reason may be that the Balloon blowing exercises provide an optimal zone of apposition (ZOA) of the diaphragm that may help to reduce LBP and this exercise have been designed in such a way, that all the core muscles get recruited while performing the exercises.

**V. DISCUSSION**

This study is aimed to compare the effectiveness of 90/90 Hemi-bridge position with ball and Core strengthening exercises on chronic low back pain in adults. The outcome measures for Pre and Post intervention in this study (VAS and Oswestry low back disability questionnaire) showed a significant difference between the effect of Balloon blowing exercise and core strengthening exercises in Chronic low back pain.

The Balloon blowing exercise in 90/90 Hemi-bridge position with ball shown a significant better result than Core Strengthening exercises. The reason is that Balloon blowing exercise focuses on the lumbar stability by promoting optimal posture. It also plays a vital role on activation of core muscles (Transverse abdominis, multifidus, diaphragm, and pelvic floor muscles).

BBE requires blowing of balloon while performing the procedure, during exhalation which helps in activation of core muscles and inhibition of Paraspinal muscles which in turn helps to activate the muscles of the back. Both the diaphragm and abdominal muscles aids in the process of breathing and maintains the stability of lumbar spine. Contraction of diaphragm causes increase in the intra-abdominal pressure which aids in the stability of spine.

The balloon blowing exercises will help in reducing pain and increases lumbar stability in LBP because they offer the diaphragm's ideal zone of apposition (ZOA), and they are created in such a way that all the core muscles are engaged while executing the activities. As the transversus abdominis contracts eccentrically during inspiration, the diaphragm contracts concentrically. During exhalation, the transversus abdominis contracts concentrically and the diaphragm eccentrically. When the diaphragm is at its strongest, the thoracolumbar fascia stabilises the lower back region of the spine.

Kyo Chul Seo et.al. showed that a balloon-blowing exercise in a 90/90 bridge position using a ball can be used to improve pulmonary function. Pranali Chougule et al concluded that 90- 90 supported hip shift with hemi-bridge with balloon exercise reduces pain in primary dysmenorrhea during menstruation. Vadivelan Kanniappan et.al concluded that there is an improvement in peak expiratory flow rate after the application of balloon blowing exercise among young adult smokers.

After completion of this study, it is found that Balloon blowing exercises alone is effective in providing lumbar stabilization and activation of core muscles which in turn helps in reducing pain and functional ability in patients with chronic low back pain.

Future research intended to describe changes in pain and function associated with the BBE is required to examine its clinical effectiveness.

## VI. CONCLUSION

This study concludes that Balloon blowing exercise in 90/90 Hemi-bridge position with ball is effective in reducing Pain and showed improvement in functional status of adults with chronic low back pain than Core strengthening exercises.

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