

# Effect of 90/90 bridging using ball and balloon exercise v/s conventional physiotherapy protocol on core strength and lung capacity using pressure biofeedback and single breath count test in 18-25 year old adults

Ranjeet N. Deshmukh<sup>1</sup>, Dr. Bhagyashri Golwalkar<sup>2</sup>

<sup>1</sup>*Undergraduate Student, Bachelor of Physiotherapy LSFPEF's College of Physiotherapy, Pune, Maharashtra, India*

<sup>2</sup>*Professor and Head of Department (HOD), Community Department, LSFPEF's College of Physiotherapy, Pune, Maharashtra, India*

**Abstract-** Core stability is essential for postural control, spinal stability, and respiratory efficiency. The present study aimed to compare the effectiveness of 90/90 bridging using ball and balloon exercises versus traditional core exercises on core strength and lung capacity. A randomized controlled trial was conducted on 40 healthy adults aged 18–25 years, divided into two groups A and B for four weeks. Both groups showed significant improvement, with greater improvement in the experimental group. The study concluded that 90/90 bridging using ball and balloon exercises is more effective in improving core strength and lung capacity.

**Keywords –** Core exercises, bridging, respiration, ball and balloon

## I. INTRODUCTION

The core musculature plays a vital role in maintaining trunk stability, posture, and efficient breathing. The diaphragm, abdominal muscles, pelvic floor, and spinal stabilizers function together to provide dynamic stability. Deficits in core strength may affect posture, movement efficiency, and pulmonary function. Developing the core muscles is important for strengthening cardiopulmonary function. The core muscles encourage cooperation between the lateral abdominal muscles and the diaphragm of the thorax, creating a synergistic effect for regulating or responding to abdominal pressure, providing stability to the trunk. For development and strengthening of core muscles and cardiopulmonary function exercise like, the ball and balloon exercises have been designed

in such a way, that all the core muscles get recruited while performing the exercises. <sup>(2)</sup> Which causes increases in intra-abdominal pressure due to activation of core muscles.

## AIM

To compare the effect of 90/90 Bridging using Ball and Balloon Exercise v/s Conventional Physiotherapy Protocol on Core Strength and Lung Capacity using Pressure Biofeedback and Single Breath Count Test in 18-25year adults.

## II. OBJECTIVES

1. To examine the effect of 90-90 bridging with ball and balloon exercise in 18-25year adult individuals core muscles using pressure biofeedback.
2. To examine the effect of 90-90 bridging with ball and balloon exercise in 18-25year individuals lung capacity using single count breath holding test.

## III. METHODOLOGY

Study Design: Randomized controlled trial.  
Type of study: experimental study  
Sample Size: 40 participants.  
Sampling Method: Simple random sampling.  
Study Duration: 4 weeks.

Study setting: The study was conducted in college premises

Participants inclusion Criteria: males and females between 18-to-25-year age group with core Strength on pressure biofeedback less than 40mmHg <sup>(9)</sup>. lung Capacity on single breath count test should be less than 30seconds <sup>(10)</sup> According to WHO Guidelines adults with Sedantary lifestyle having moderate- intensity aerobic physical activity less than 300 minutes or vigorous- intensity aerobic physical activity less than 50minutes per week.<sup>(11)</sup>

Exclusion criteria: recent spine injury and deformity, lung infection, abdominal surgery within 2 months.

Material used: Pressure Biofeedback, Ball and Balloon, mats Outcome measure: Pressure biofeedback unit, Lung capacity

#### IV. INTERVENTION

Group A performed 90/90 bridging using ball and balloon exercises emphasizing diaphragmatic breathing and core activation. The exercises were performed for 15 mins , once in a day for 3 days in a week. Total duration of the protocol was 4 weeks. Group B received traditional core strengthening exercises such as prone bridge, supine bridge, and abdominal strengthening. The exercises were performed for 30 mins in a day for 3 days in a week.

#### V. STATISTICAL ANALYSIS

Data was analyzed using appropriate statistical tests. Pre- and post-intervention values were compared within and between groups. The normality of the distribution of data was assessed by Shapiro-wilk test. Statistical significance was set at  $p < 0.05$ . To compare the pre and post results of both the groups paired t test was used. Medclac software (version 23.4.0) was used for statistical analysis.

#### VI. RESULTS

Both groups demonstrated significant improvement in core strength and lung capacity. The experimental group showed superior improved core strength and lung capacity compared to the control group.

#### VII. DISCUSSION

Core strength plays a very important role in maintaining postural stability and efficient movement of the body. A strong core provides a stable base for limb movements, helps maintain proper posture, prevents injuries, and improves overall performance in day-to-day as well as athletic activities. Lung capacity, on the other hand, refers to the total amount of air the lungs can hold after maximum inspiration. It is an important measure of respiratory health and endurance.

The present study was performed to compare the effects of conventional physiotherapy protocol versus ball and balloon exercise on core strength and lung capacity in adults of 18-25 years. The data was normally distributed using Shapiro-wilk test, paired t test was used to compare the pre and post results of both the groups, statistical analysis was done using medclac software. In the experimental group, a greater increase in mean core strength (from  $23.5 \pm 2.62$  to  $32.7 \pm 2.40$ ) and lung capacity (from  $24.4 \pm 2.92$  to  $31.45 \pm 3.05$ ) was observed compared to the control group (core strength:  $23.1 \pm 2.42$  to  $30.35 \pm 2.30$ ; lung capacity:  $22.4 \pm 3.03$  to  $28.55 \pm 2.30$ ). This can be attributed to the specific mechanics of the *ball and balloon exercise*, which optimizes the zone of apposition (ZOA) of the diaphragm. By maintaining the 90/90 bridge position, the pelvis and rib cage alignment enhance diaphragmatic function, improve intra-abdominal pressure regulation, and recruit deep core stabilizers like the transversus abdominis and pelvic floor muscles more efficiently.

The findings suggest that integrating breathing techniques with core exercises enhances neuromuscular coordination. Balloon-assisted breathing improves diaphragmatic activation and intra-abdominal pressure, contributing to improved outcomes. Resulting into overall improvement in posture, lung capacity and core strength.

#### VIII. CONCLUSION

90/90 bridging using ball and balloon exercises is more effective than traditional core exercises in improving core strength and lung capacity.

#### LIMITATIONS

The study had a small sample size and short duration.

#### FUTURE SCOPE

Future studies can be conducted on larger populations, longer duration, and clinical populations with respiratory or postural dysfunctions.

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#### REFERENCES

- [1] Effectiveness of Exercise with Balloon for Low Back Pain in Young Adults: A quasi experimental study. *Indian J Physiother Occup Ther.* 2020;14(4):20–6.
- [2] Delgado BJ, Bajaj T. Physiology, Lung Capacity. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 [updated 2023 Jul 24; cited 2024 Jul 22].
- [3] Mistry I, Patel R, Tank P, Sonpal D, Rakholiya P, Patel R. Prevalence of core muscle weakness in 18–25 years old females. 2021.
- [4] Nagarwala R, Dhotre P, Gelani I. Correlation between core strength and breath-holding time in normal young adults. *J Orthop Rehabil.* 2011;75–8.
- [5] Kim HS, Cho SH. Correlation between lung function and functional movement in healthy adults. *Healthcare (Basel).* 2020;8(3):276.
- [6] Misra A, Pawar R, Pal A. Effect of balloon-blowing exercise on oxygen saturation in COVID-19 patients. *Cureus.* 2023;15(6):e40250.
- [7] Bhore P, Bathia K, Kanase S. Prevalence of core weakness in bank employees. *J Clin Diagn Res.* 2019;13:17–20.
- [8] Cairns MC, Harrison K, Wright C. Pressure biofeedback: A useful tool in the quantification of abdominal muscular dysfunction? *Physiotherapy.* 2000;86(3).
- [9] Khan M, Zafar H, Gilani SA. Inter-rater reliability of pressure biofeedback unit among individuals with and without chronic low back pain. *Pak J Med Sci.* 2022;38(4 Pt II):987–91.
- [10] Bhandari SK, Bist A, Ghimire A. Single breath count test and its applications in clinical practice: a systematic review. *Ann Med Surg (Lond).* 2024;86(4):2130–6.
- [11] Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med.* 2020;54(24):1451–62.
- [12] Effects of 90/90 Bridge with Ball and Balloon Exercise on Lung Volumes and Quality of Life in Patients with COPD. *Indian J Physiother Occup Ther.* 2020;15(1):147–54.
- [13] Cavaggioni L, Ongaro L, Zannin E, Iaia FM, Alberti G. Effects of different core exercises on respiratory parameters and abdominal strength. *J Phys Ther Sci.* 2015;27(10):3249–53.