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EFFECTIVENESS OF 90/90 SUPPORTED HIP SHIFT WITH HEMIBRIDGE BALL AND BALLOON EXERCISES ALONG WITH DIAPHRAGMATIC BELLY BREATHING TECHNIQUE ON IMPROVING PULMONARY FUNCTION AND REDUCING PAIN IN PATIENTS WITH CHRONIC BACK PAIN

Pulmonary Medicine

Dr. C. K. Muralidharan	M.P.T, PhD, Professor, Nandha College Of Physiotherapy, Erode-638052
M. Mahendran	MPT, Cardio Respiratory, Assistant Professor, Nandha College Of Physiotherapy. Erode – 638052.
Dr. A. Prakash	M.S, Ortho, Department Of Orthopaedics, Nandha Medical College And Hospitals, Erode-638052
Dr. S. Saranya	M.D, Respiratory Medicine, Department Of Respiraory Medicine, Nandha Medical College And Hospitals, Erode-638502.
Mr. P. Saranraj	PhD Scholar Meenakshi Academy Of Higher Education And Research Institute, Chennai

ABSTRACT

Background Non specific low back pain is the universal problem now a days. Any type of back pain in the lumbar region that is related to severe pathology and does not have a specific cause.Inferior breathing patterns and dysfunction of posture and trunk stability are often associated with low back pain. Treatment with traditional core stabilization exercises has caused recurrence of LBP. Respiration is also affected by poor weakness of core muscles. Immediate effects of has been studied on chronic pain in athlete population. In this research 90/90 hip shift with hemibridge ball and balloon exercises along with diaphragmatic belly breathing technique on improving pulmonary function and reducing pain with chronic back pain patients. **Method** Twenty people with chronic back pain were pruposive sampling method assigned either to a group that was treated with 90/90 hip shift ball and balloon exercises along with diaphragmatic belly breathing technique to improve pulmonary function and reduce the low back pain. **Result** The study sample comprised 20 subjects all the subjects underwent performa. The subjects were given 90 / 90 supported hip shift with hemi bridge ball & balloon and diaphragmatic belly breathing technique. The pre and post values were assess by forced expiratory volume: The Mean difference value is – 0.15.The standard deviation value is – 0.126. The paired 't' test value is – 5.36. The pre and post values were assessed by forced vital capacity.The Mean difference value is – 0.27. The standard deviation value is – 0.12.The paired 't' test value is – 9.75.The pre and post test values were assessed by visual analogue scale. The Mean difference value is – 1.7.The standard deviation value is – 0.6. The paired 't' test value is – 12.7 **Conclusion** The present study concludes that there are immediate effects of 90/90 supported hipshift with hemibridge ball and balloon exercise on pain, FEV1, FVC and functional ability in patients with chronic low back pain.

KEYWORDS

90/90 supported hip shift hemi bridge, diaphragmatic belly breathing technique, low back pain, FEV1, FVC

INTRODUCTION

The ordinary respiratory mechanism is a combination of thoracic and abdominal breathing but their relative ratio caries with the individual. Thoracic breathing is the elevation of the ribs in inspiration, the upward movement of the sternum and the flattening of the abdominal wall. Sometimes in forced thoracic breathing the wall is pulled in so that hollow appears below the costal arch. Abdominal breathing is that in inspiration the anterior abdominal wall bulges out following the contraction intra- abdominal pressure.This bulge disappers in expiration. particularly in strong expiration where the tightening of transverse abdominis inspiration in abdominal breathing affected exclusively by the contraction and a flattening bof the diaphragm. Expiration,on the other hand, is entirely due to the contraction of the abdominal wall which furnishes the expiratory back stock against the relaxed diaphragm.The costal fibers of the diaphragm run vertically from the origin in close apposition to the rib cage, before curving to insert into the central tendon.That portion of the diaphragm which is close to the inner wall of the lower rib cage, is called zone of apposition.

Low backache is a very common problem and has a ubiquitous distribution.Posture is an entity seen only in human beings, thanks to the two legged posture. Backachecan either be acute subacute or chronic in nature.In the Western industrialised countries, LBP is a major health problem. The annual prevalence of LBP is stated to be 15% to 45% with a point prevalence of approximately 30%. Sixty percent of individuals who experience acute LBP recover in 6 weeks and up to 80% to 90% recover within 12 weeks. The incidence of LBP in India has been reported to be 23.09%. It has a lifetime prevalence of 60% to 85%. Among these individuals, 67% have psychological problems, 57% were in blue colour job, 26% had to leave their profession and 38% were not satisfied with their present job. Dysfunction of diaphragm, pelvic floor muscles and changes in breathing pattern were noticed in patients with backpain. Biomechanically diaphragm to maintain the trunk stability, it activation by phrenic nerve, results in increases intra-abdominal pressure which eventually increases spinal stiffness.

In 90/90 supported hipshift exercise, It normalize trunk and pelvic position in the sagittal plane. . This positioning limits range of motion, as progressing in to extension borrows mobility and degree of freedom from the frontal and transverse planes.

This shift occurs by achieving a zone of apposition.The ZOA is the amount of diaphragm muscle that lies directly next the rib cage. If the rib flare up, the diaphragm descends, making the ZOA smaller. ZOA size increases as the diaphragm ascends and pulled down, back and in of the ribs.

This position allows for greater intra-abdominal pressure. Hip shift to encourage a paced breathing strategy and normalizes PH and carbon dioxide levels.paced breathing will be very calming and relaxing. The more time spend with exhalation, the larger increase in parasympathetic nervous system activity.

A balloon works differently than Spirometry, because these tool focus only on forceful exhalation. A balloon is both an inhalation and exhalation device. During exhale into the balloon, resistance is provided to reinforce a forceful exhalation. Air kept in the balloon two ways; First, the tongue is placed on the roof of the mouth. This position create pressure on the palate and neck muscles are relaxed.Next attempting the inhale, use of accessory muscles will bereduced and maintaining the ZOA by ecentric abdominal activation. This events promotes normal Diaphragmatic descension during inhalation.

Diaphragmatic breathing exercise that helps strengthen the diaphragm, improve the pulmonary function. Diaphragmatic breathing also known as "abdominal breathing" or "belly breathing". Normal breathing us fairly shallow and doesn't use the full capacity of the lungs. Diaphragmatic Belly breathing may be a deep breathing exercise that completely engage the diaphragm and increase the efficiency of the lungs.

METHOD

A Total of 20 LBP patients included in this study all subjects provided

written informed constant before entering the study. LBA assessed by visual analog scale and physiotherapy assessment format. LBP with age between 21- 55 years.

The purposive sampling technique would be adopted for this study, who fulfilled in the inclusion criteria.

Study Design
Quasi experimental study design

Study Duration
The study was conducted three months

Treatment duration:
Three sessions over three days in week

Outcome Measures
The tool used to measure the effectiveness of 90/90 supported hip shift with hemibridge ball and balloon to assess the VAS scale for low back pain.

The tool used to measure the diaphragmatic breathing technique to measure the FEV1 and FVC for pulmonary function.

Intervention
Treatment Procedure
Protocol

- Participants were given exercise called as hemi bridge with ball and balloon exercise for 3 sessions over 3 days
- Diaphragmatic belly breathing techniques for 3 sessions over 3 days

Instructions

- Lie on back with feet on a wall and knees and hips bent at 90° angle.
- Place a 4-6" ball between knees
- Place right arm above head and a balloon in left hand
- Inhale through nose and as exhale through mouth perform a pelvic tilt so that tailbone is raised slightly off the mat.
- Keep low back flat on the mat. Do not press feet flat in the wall; instead dig down with heels
- Shift left knee down so that it is below the level of right without moving feet. should feel left inner thigh engage.
- With left knee shifted down, take right foot off the fall should feel the back of the left thigh engage. Maintain this position for the remainder of the exercise
- Now inhale through nose and slowly blow out into the balloon
- Pause 3 seconds with tongue on the roof of mouth to prevent airflow out of the balloon.
- Without pinching the neck of the balloon and keeping tongue on the roof of the mouth, inhale again through nose.
- Slowly blow out as stabilize the balloon with hand.
- Do not strain neck or cheeks as blow.
- After the fourth breath in, pinch the balloon neck and remove it from mouth. Let the air out of the balloon.
- Relax and repeat the sequence 4 more times.

Diaphragmatic Belly Breathing Technique
Place one hand on the abdomen slightly below the breastbone. Slowly inhale through the nose and feel the belly rise into the hand. Slowly exhale through pursed lips and feel the belly fall faraway from the hand. Keep the shoulders relaxed – not hunched up. Do this sitting or lying in a comfortable position. Repeat 5 times a session.

Data Presentation And Analysis
Table 1. Mean difference and standard deviation values of FEV, FVC & VAC

Group	Mean difference	Standard deviation
FEV1	0.15	0.12
FVC	0.27	0.12
VAS	1.7	0.6

Table 1.2 Paired 't' values of FEV_1, FVC & VAS

Group	Table Value	Paired 't' Value
FEV1	2.05	5.36
FVC	2.05	9.75
VAS	2.05	12.75

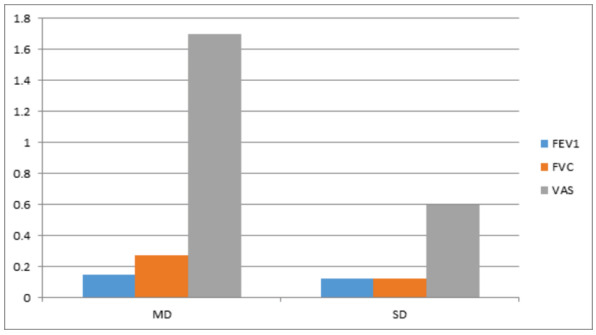

Fig: 1.1 Mean difference and standard deviation values of FEV, FVC & VAC

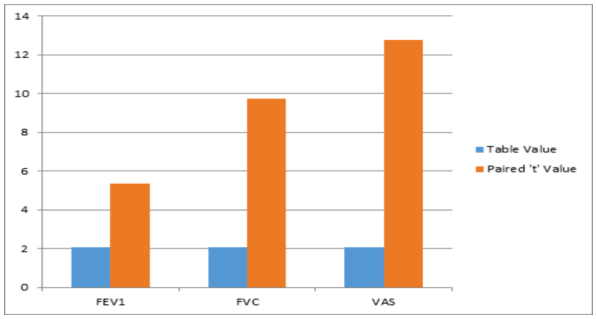

Fig: 1.2 Paired 't' values of FEV_1, FVC & VAS

RESULTS
The study sample comprised 20 subjects all the subjects underwent performa. The subjects were given 90 / 90 supported hip shift with hemi bridge hall &balloon and diaphragmatic belly breathing technique. The pre and post values were assess by forced expiratory volume: The Mean difference value is – 0.15.The standard deviation value is – 0.126. The paired 't' test value is – 5.36. The pre and post values were assessed by forced vital capacity.The Mean difference value is – 0.27. The standard deviation value is – 0.12.The paired 't' test value is – 9.75.The pre and post test values were assessed by visual analogue scale. The Mean difference value is – 1.7.The standard deviation value is – 0.6. The paired 't' test value is – 12.75.

DISCUSSION
This study used 90/90 supported hipshift with hemibridge ball and balloon exercises, to correct the postural instability which is a cause to pain. The pain scores on VAS were low when measured previous to the treatment. Indeed though statistically significant change was noted, clinically truly minimal change was seen. The ZOA of the diaphragm helps to maintain optimal respiration, trunk stabilization and prevent LBP. In the present study, the exercise targeted the ZOA and spine to a proper position, diaphragm can function effectively to perform respiration and to maintain posture. These exercise cause slow breathing and is considered further to relax the neuromuscular system and decrease the resting muscle tone. Respiratory function has been reported to be related to low back pain. A correlation study done by Mellin indicate that chronic low back pain is associated with the restrictionof the movements in the thoracic spine and this association may affect respiratory function test In the presentstudy, the value of FEV1 showed clinically minimum change. The FVC values were statistically significant. The change in the FVC could be attributed to the component ofblowing the balloon of hemibridge with ball and balloon exercises. During the activity, coordinated activity of transversus abdominis and diaphragm is required to maintain respiration and stability. During inhalation, there is concentric contraction of diaphragm and eccentric contraction of transversus abdominis and during exhalation there is concentric contraction of transverses abdominis and eccentric contraction of diaphragm. Blowing the balloon requires deep inhalation followed by forceful exhalation. The eccentric contraction of both diaphragm and transverses abdominis during exhalation and inhalation may have developed strength and optimize ZOA and therefore improve the respiratory function.It also concentrates on neuromuscular control of the deep core muscles. Activation of these muscles may have contributed to correction of lumbar lordosis, there by correcting faulty posture causing pain. Blowing the balloon during exhalation helps in

the activation of the abdominal muscles and inhibition of the paraspinal muscles. This also contributes in the correction of the lumbar lordosis thereby increasing the functional capbility of the participant.

CONCLUSION

The study concludes that there are immediate effects of hemibridge with ball and balloon exercise on pain, FEV_1, FVC and functional ability in patients with chronic low back pain. The traditional notion that the chronic nonspecific LBP can be treated only with the electrotherapeutic should be abandoned and newer and creative methods of exercise therapy should be implemented to correct non-specific low back pain.

REFERENCES

1. Lee SC, Sin SH, Lee HM, et al.: The effects of balloon blow-ups and upper abdominal exercise on respiratory rehabilitation. Korean Acad PhysTherSci, 2011,18: 43–53.
2. Jun HJ, Kim KJ, Nam KW, et al.: Effects of breathing exercises on lung capacity and muscle activities of elderly smokers. J PhysTherSci, 2016, 28: 1681–1685.[Medline] [CrossRef]
3. Jo NO, Park SW, Lee SJ, et al.: The effects of respiratory rehabilitation training on respiratory functions of cervical spinal cord injury patients. Korean JRehabilNurs, 2011, 10, 108–115.
4. Gosselink RA, Wagenaar RC, Rijswijk H, et al.: Diaphragmatic breathing reduces efficiency of breathing in patients with chronic obstructive pulmonary disease. Am J RespirCrit Care Med, 1995, 151: 1136–1142. [Medline]
5. Balagué, Federico, et al. "Non-specific low back pain." *The Lancet* 379.9814 (2012): 482-491
6. Nachemson AL, Waddell G, Norlund A. Epidemiology of neck and low back pain. In: Nachemson AL, JonssonE, editors. Neck and back pain: the scientific evidence of causes, diagnosis and treatment. Philadelphia (PA):Lippincott Williams & Wilkins, USA, 2000.
7. Mayer, Tom G. "Functional restoration for spinal disorders." *The Sports Medicine Approach* (1988).
8. Merritt, Hiram Houston, Henry L. Moses, and Lucy Moses. *A Textbook of Neurology*. Philadelphia: Lea & Febiger, 1979.
9. Sharma, S. C., et al. "Incidence of low back pain in work age adults in rural North India." *Indian Journal of Medical Sciences* 57.4 (2003): 145-147.
10. Krismer, M., and M. Van Tulder. "Low back pain (non-specific)." *Best Practice & Research ClinicalRheumatology* 21.1 (2007): 77-91.
11. Ostwal, Priyanka P., and S. K. Wani. "Breathing patterns in patients with low back pain." *International Journal of Physiotherapy and Research* 2.1 (2014): 347-353.
12. Boyle, Kyndall L., Josh Olinick, and Cynthia Lewis. "The value of blowing up a balloon." *North AmericanJournal of Sports Physical Therapy: NAJSPT* 5.3 (2010): 179.
13. Represas-Represas, Cristina, et al. "Screening for chronic obstructive pulmonary disease: validity and reliabilityof a portable device in non-specialized healthcare settings." *Plos One* 11.1 (2016): e0145571.
14. Mellin, Guy, and RitvaHarjula. "Lung function in relation to thoracic spinal mobility and kyphosis." *ScandinavianJournal of Rehabilitation Medicine* 19.2 (1987): 89-92.
15. Renuka *et al*; a study to find out effectiveness of balloontherapy on respiratory status of patients with lowerrespiratory tract disorders. 2016.
16. Ms. Arunimasrilatha, bharathividhyapreeth ; the effectof balloon therapy and incentive spirometry inpromotion of pulmonary function with acute infection,Deemed University college of Nursing, NAVI, Mumbai,India *international journal of nursing research* 2016;vol no 2(1) Pp.123 to 132
17. Kim, Jin-Seop, Lee, Yeon – Seop, A study to assess theeffects of balloon – blowing exercise on lung function ofyoung adult smokers, *journal of physical therapy sciences* 2012, vol 24.
18. Rick Rockwell A study to assess the lung exercises with balloons, Live strong. Com august 16, 2013.
19. Chuahan AJ, John PM, Linda G, Patrick D. Regular balloon blowing for chronic bronchitis.BMJ.1992 ;304:1668-9.
20. Rafaqat A, Mushtaq Z, Tahir A, Shahzad MF. Comparison between Balloon Blowing Exercise and Incentive Spirometry in Patients with Chest Intubation after Trauma. J Nov Physiotherapy.2016; S3: 013.

Website:

21. http://www.livestrong.com/article/154898-the-use-of-bubbles-for-breathing-exercises. Accessed February 18, 2017.
22. http://www.copdcanada.ca/Pursed%20Lip%20Breathing%20Part%202.htm, Accessed February 18, 2017.