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Effect Of Dynamic Neuromuscular Stabilization Breathing Technique On Chest Wall Mobility And Thoracic Kyphosis In Elderly People:An Experimental Study.

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ABSTRACT

BACKGROUND: Dynamic Neuromuscular Stabilization (DNS) approach evaluate and activates the spinal stabilizers to optimize the performance of posture and respiratory system. This study investigated the effect of DNS breathing exercise on chest wall mobility and thoracic kyphosis in an elderly people who experience changes and decreases in all their body systems.

AIM: To see the effect of DNS breathing technique on chest wall mobility and thoracic kyphosis in elderly people.

METHODOLOGY: Subjects were selected by using simple random sampling. 38 subjects were selected by Inclusion criteria. Subjects were evaluated for chest expansion and thoracic kyphosis. Subjects got treatment of DNS breathing exercise protocol with 20 stabilization developmental pattern (six times a week for six weeks) was implemented and after its completion, all post parameters were taken. Descriptive statistical and the paired-sample t test were used to analyze data.

RESULT: Significant improvement were observed in the post -test score compared with pre-test score in chest wall mobility and thoracic kyphosis.

CONCLUSION: Our studies showed there is changes in chest wall mobility and thoracic kyphosis in elderly people. Due to the effectiveness of DNS training on physical function (chest wall mobility and thoracic kyphosis). It is recommended that the provided training protocol be used for improving respiratory function and posture and provide physiological stabilization for overall health and performance of elder person.

Clinical Implication: According to the therapist DNS breathing techniques can be used for 6 weeks could lead to statistically significant improvement in the chest wall mobility, and thoracic kyphosis in elderly people.

INTRODUCTION

All of the body's systems, including the respiratory system, will alter and weaken as people age. The elderly will experience changes and decreases in all their body systems; one of them is the respiratory system. Alterations in the lungs in the elderly include a loss of tone and muscle mass, resulting in a decrease in lung expansion and reduced compliance of the chest wall.[1] Respiratory function and chest wall mobility are intimately associated. The chest wall is an elastic structure that moves with the lungs, just like the lungs do.[2]

With age, the ribs of the chest become rigid and breathing movements require more force. Although the respiratory muscles decrease with age, the weakness of the respiratory muscles limits the expansion of the chest wall, resulting in a larger decrease in lung volume than expected. Furthermore, age-related chest kyphosis may contribute to reducing the mobility of the chest wall and the volume of the lung.[3] Age-related increases in functional residual capacity, reductions in chest wall mobility, and geometric alterations in the rib cage all compromise the performance of the respiratory muscles.[4]

Thoracic kyphosis tends to increase with age, it is common in elderly people and it may have negative health effects and increased mortality. Hyperkyphosis defined as excessive curvature of the thoracic spine in the sagittal plane. Hyperkyphosis affects 20% to 40% of the population and is more common in the elderly. Hyperkyphosis has a multifactorial etiology. The vertebral bodies and intervertebral discs are the two main anatomical structures that influence the sagittal curvature of the spine. Therefore, any procedure that causes the vertebral bodies to wedge anteriorly or Kyphosis will increase due to the disc's asymmetric collapse.[3]

Thoracic hyper kyphosis has a variety of negative health implications, including impairment in physical function, decreased pulmonary function, increased vertebral fractures, increased falls, and an increase in mortality. Several observational studies have shown that hyper kyphosis causes physical function impairment.[5]

According to research, thoracic hyper kyphosis and chest malalignment significantly impaired lung volumes, changed the motor control strategy, and compromised respiratory system mechanics. Additionally, respiratory dysfunction that results from movement impairment of the rib cage and thoracic alignment, affects the mechanical efficiency of the respiratory muscles. Consequently, reduces the activation of these muscles especially the capability of diaphragm force generation.[6]

DNS is a functional approach perspective that combines brain stimulation, manipulation mobilization, postural awareness, breathing training, and education to attain optimal and global body function. Furthermore, it can be considered a "neutral" and "optimal" alignment of the head and neck, spine, thoracic, and pelvis and strongly suggests that a healthy sensorimotor system is essential to design an ideal function that centres the joints. Joint centration reduces mechanical stress on relevant passive tissues and reduces overactivation of superficial muscle.[7] According to research, thoracic hyper kyphosis and chest malalignment significantly impaired lung volumes, changed the motor control strategy, and compromised respiratory system mechanics. Additionally, respiratory dysfunction that results from movement impairment of the rib cage and thoracic alignment, affects the mechanical efficiency of the respiratory muscles. Consequently, reduces the activation of these muscles especially the capability of diaphragm force generation.[6]

DNS is a functional approach perspective that combines brain stimulation, manipulation, mobilization, postural awareness, breathing training, and education to attain optimal and global body function. Furthermore, it can be considered a "neutral" and "optimal" alignment of the head and neck, spine, thoracic, and pelvis and strongly suggests that a healthy sensorimotor system is essential to design an ideal function that centres the joints. Joint centration reduces mechanical stress on relevant passive tissues and reduces overactivation of superficial muscle.[7] Such a purpose may be served by the Dynamic Neuromuscular Stabilization (DNS) approach, which is an assessment and treatment approach based on developmental kinesiology models.[8]

Exercise intensity according to developmental kinesiology's definition of natural postural-locomotion patterns, which is automatically appropriate activation stereotype of stabilization and breathing. By placing the participants in developmental positions of an infant at three months to thirteen months of age, the stabilizers can be activated to achieve this goal.[7] According to Abe et al. (1996), the transverse abdominal muscle is the most significant abdominal muscle in breathing, particularly in expiration. DNS breathing exercises have been shown to specifically target the transverse abdominal muscle. Transverse abdominal activation, as one of the primary local stabilizers and respiratory muscles, increases intra-abdominal pressure, which is one of the purposes of DNS breathing exercise, and causes lumbar spines to straighten.[7] Furthermore, with a proper cylindrical form of the abdominal area and intra-abdominal pressure, the rib cage can be upwardly pressed rather than anteriorly flared, allowing for optimal thoracic spine extension. [7]

Studies in the scientific literature have demonstrated the benefits of deep muscle training, lumbar-pelvic motor control exercises, and various core exercises on respiratory parameters, abdominal strength, and improved respiratory function, as well as on the quality of breathing and posture. Postural stability and physiologically balanced breathing, however, depend on the thoracic cavity's initial alignment and motor function. The diaphragm's mechanical action and respiratory advantage are contingent upon its anatomical alignment and relationship with the rib cage.[8]

OBJECTIVES

- To assess the effect of Dynamic Neuromuscular Stabilization Breathing Technique on chest expansion In Elderly People by using measuring tape.
- To assess the effect of Dynamic Neuromuscular Stabilization Breathing Technique on thoracic kyphosis in Elderly people by using occiput to wall distance.

HYPOTHESIS

NULL HYPOTHESIS:

- There will be no significant effect of Dynamic Neuromuscular Stabilization (DNS) Breathing Technique on chest expansion In Elderly People.

- There will be no significant effect of Dynamic Neuromuscular Stabilization (DNS) Breathing Technique on Thoracic kyphosis In Elderly People.

ALTERNATE HYPOTHESIS:

- There will be significant effect of Dynamic Neuromuscular Stabilization (DNS) Breathing Technique on Chest expansion In Elderly People.

- There will be significant effect of Dynamic Neuromuscular Stabilization (DNS) Breathing Technique on Thoracic kyphosis In Elderly People.

REVIEW OF LITERATURE

1. **Mohammad Rahimi et al (2020)** This study conducted on Efficacy of DNS Breathing Exercise on Chest wall mobility, Trunk muscles, and Thoracic kyphosis. They concluded that DNS Breathing Technique significantly improve upper chest mobility and lower chest mobility, trunk muscle endurance, and thoracic kyphosis. They suggested that DNS Breathing Exercise be introduced to improve chest mobility and posture and provide physiological stabilization for the overall health and performance of student.

2. **Nasser Mohammad Rahimi et al (2019)** This study conducted on effect of DNS Breathing Exercise on some spirometry indices of sedentary students with poor posture. They concluded that DNS Breathing exercise is an effective protocol to improve respiratory function as it works on Integrated Spinal Stabilization System (ISSS) and Breathing Technique. It is an effective instructive approach to prevent risk of malalignment.

3. **Daiki Adachi et al (2014)** This study conducted on age related decline in Chest wall mobility. In women 65 years of age or older who lived in the community, there was a decrease in both respiratory function and chest wall movement at the axillary level with age. So, they concluded that chest wall mobility and respiratory function decreased with age.

4. **Tamir Ailon et al (2015)** This study conducted on progressive spinal kyphosis in the aging population. They concluded that kyphosis is common in older individuals and its prevalence is expected to increase. Hyperkyphosis is associated with vertebral fractures, impaired physical function, decreased quality of life, and increased mortality. They also suggest that non operative therapies can be useful in reducing kyphosis and may delay its progression.

5. **M. RAHIMI, Z. HASANPORI et al. (2021)** This study conducted on effect of Dynamic Neuromuscular Stabilization Training on balance, fall risk and lower extremity strength in healthy elderly women. According to the result of study shows DNS training reduce the risk of falls, and improve static balance,

dynamic balance and lower limb strength enhancement. so, trainers and therapists could use DNS exercise according to the special need of the elderly. They concluded that the effect of DNS training in improving research variables is confirmed, and its use in elderly care programs is recommended.

6. **Mohmmad Hansi Mansori et al (2019)** This study Conducted on Effect of Six-week Dynamic Neuromuscular Stability training on performance Factors and Quality of Life in the Elderly. They advised that the DNS training protocol be used for prevention and rehabilitation, raising the level of physical fitness and quality of life as a low-cost treatment, among the elderly due to the effectiveness of DNS training on physical function and the significance of the elderly lifestyle.

7. **Susan E. Et al. (2005**) This study Conducted on measuring thoracic excursion: Reliability of the cloth tape measure technique to evaluate how accurate it is to measure thoracic respiratory excursion—a measure of chest expansion or mobility—using a cloth tape measurement. Men demonstrated a high degree of reliability when utilizing a tape measure to measure thoracic excursion, leading to ICCs with significant reliability. The results of this study clearly imply that measuring thoracic excursion at two levels using the tape-measure method could be accurate and practical in a clinical setting.

8. **Pipatana Amatachaya, et al. (2016)** This study conducted on Validity and reliability of a thoracic kyphotic assessment tool measuring distance of the seventh cervical vertebra from the wall to examine the validity and reliability of a basic kyphosis measurement that measures the distance from the wall (C7WD) to the seventh cervical vertebra (C7) perpendicularly. Thus, increased cervical lordosis frequently correlates with increased thoracic kyphosis, increasing the distance when leaning against a wall, from C7 to the wall or C7WD. Consequently, the C7WD demonstrated a strong correlation with the kyphosis angle as determined by the Flexicurve. The results of this study validate the validity and reliability of C7WD for kyphosis severity assessment and monitoring by a health professional, village health volunteers (VHV), and community members, caregiver.

9. **Made yoga Parwata et al. (2021)** This study conducted on Correlation between the mobility of the above cage and the below thorax cage toward the elderly lung vital capacity. This study demonstrates a highly significant positive correlation between the elderly's vital lung capacity and the mobility of their upper and lower thoracic cages.
10. **Mauro Di Bari et al. (2004)** This study conducted on Thoracic Kyphosis and Ventilatory Dysfunction in Unselected Older Persons: An Epidemiological Study in Dicomano, Italy, to determine whether ventilatory dysfunction is linked to kyphosis in elderly community members. They concluded that Dyspnea and restrictive and obstructive types of ventilatory dysfunction are linked to kyphosis. When making a differential diagnosis for dyspnea and ventilatory dysfunction in the elderly, kyphosis should be considered.

METHODOLOGY

1. Type of Study – An Experimental Study
2. Study design – Pre and post experimental study

3. Study duration – 6 Months
4. Type of sampling – Simple random sampling
5. Sample size – 38
6. Study setting – community and old age home of Miraj.

MATERIALS

1. Consent form / Data collection sheet
2. Plinth/Bed
3. Measuring tape
4. Two metal scale
5. Stop watch
6. Sphygmomanometer
7. Stethoscope

Figure 1

Figure 2

Figure 3

Figure 4

INCLUSION AND EXCLUSION CRITERIA

Inclusion criteria

1) Both male and female are included.
2) Age group with 55-75yrs old.
3) Subjects with no history of smoking/tobacco habits.
4) Subject with poor posture (Occiput to wall distance > 7cm)
5) Chest expansion should be reduced than normal ratio.
6) Vitals should be normal.
7) BMI =31–32 and 27–28 kg/m2 for female and male, respectively.

Exclusion criteria

1) History of any Neurological conditions.
2) Presence of myopathic disorders.
3) Subject who use of drugs to known to affect the CNS.
4) Subject who use of drugs to known to affect the muscle strength.
5) Vestibular and auditory defect.
6) Subject who having any respiratory disorders.
7) Balance issue.
8) History of Thoracic and Cardiac Surgery.
9) Presence of Vertebral Fracture.
10) Unstable hypertension.
11) Person doing regular physical activity.

OUTCOME MEASURES

Chest expansion assessment: -

The measurement of chest expansion using measuring tape.
During the measurements, the participants stood with their hands at their sides, and their chest circumference was measured with a measuring tape at maximal inhalation and maximal exhalation at 3 levels:

1. Axillary level
2. Nipple level
3. Xiphisternum level

Ratio will be calculated and decrease in the value of chest expansion ratio will show decrease in chest expansion. (Normal ratio 1:2:1)

Figure 6 = Assessment of Chest Expansion

Thoracic kyphosis Assessment

The measurement of the Thoracic kyphosis from 7th cervical vertebra to wall distance.

Starting position: -

Participants stood upright, as tall as possible, with both heels, sacrum, and back against the wall and their head in a neutral position.C7WD measured using rulers: The method requires two rulers, the first ruler being placed on the C7 bony prominence and the other ruler used to quantify the perpendicular distance from the alignment of the first ruler to the wall .The C7WD of at least 7.5 and cm had the diagnostic properties to determine the risk of thoracic hyperkyphosis.

Figure 7 = Assessment of thoracic kyphosis

PROCEDURE

Ethical clearance was obtained from institutional ethical committee.

↓

Screening was done

↓

Subjects were selected according to inclusion and exclusion criteria

↓

Written consent was taken

↓

Participants will be explained about the study in their vernacular language.

↓

Pre intervention assessment=Vitals, BMI, chest expansion and thoracic kyphosis.

↓

Intervention = DNS Breathing exercise protocol [6week = 6sessions/week]
(The 20 Stabilization developmental pattern)

↓

Post interventional assessment = chest expansion and Thoracic kyphosis.

↓

Statistical analysis

↓

Result

PROTOCOL

- **DNS Breathing Exercise Protocol:**

Week and Session	**Exercise Description**	**set**
week 1 Session 1-6	Supine breathing exercise Prone breathing exercise breathing exercise 90/90	SET 1: 10 repetitions 1Seconds inhale: 2Seconds exhale 60-90 seconds rest period
Week 2 Session 7-12	Prone Position: elbow support (3 months old position) Supine position 90/90: arm outside the body (3 months old position) Supine position 90/90: hand on the abdomen (4 months old position) Creeping position (one hip knee in flexion): elbow support, ASIS and medial epicondyle of the opposition knee (4.5-month-old position)	
Week 3 Session 13-18	Rolling pattern (ipsilateral) position (5 months old position) Supine position 90/90: hand on the knee (5months old position) Prone position: hand and knee support (elbow is extension) (6 months old position) Supine position (hip and knee in 45-degree flexion): hand on the foot (6 months old position)	SET 2: 15 repetitions 2Second inhale :4Second exhale 60-90second rest period

Week 4 session 19-24	quadruped position (the angle between trunk and hip is 120 degree) (7 months old position) quadruped position (the angle between trunk and hip is 90 degree) (7 months old position) oblique sit position (side plank) with arm and lateral knee support) (7 months old position) oblique-sitting position with hand support (elbow is extended) (8 months old position)	SET 3: 20 repetitions 3second inhale: 6 second exhale 120-150 second rest period
Week 5 Session 25-30	Crawling position (9 months old position) sitting position (keep the spine upright and elongated (10 months old position) side-lying (side plank) with hand, lateral knee and opposite foot support (10 months old position) Raising position (keep the spine forward and elongated and one led kneeling) (11 months old position)	
Week 6 session 31-36	High kneeling" position (keep the spine upright and elongated and one leg kneeling) (11 months old position) Bear position (12 months old position) Squat position (12 months old position) Standing position (initial standing position) (13 months old position)	

Supine Breathing Exercise

Prone Breathing Exercise

Breathing Exercise 90:90

Prone position: Elbow support

Supine position 90/90m :
Arm outside the body

Supine Position 90/90 :
Hands on the abdomen

Figure 8

Creeping position

position90/90: Hands on knee

Prone position: Hands & knee support

Supine: Hip & Knee 45 in Flexion

Quadruped position (the angle between trunk and hip is 120˚)

Quadruped position (the angle between trunk and hip is 90˚)

Oblique sit position:(Side plank)with arm & knee support

Obilique sitting position:with hands support(Elbow is extended)

Figure 9

Crawling position

Sitting position:Spine upright and elongated

Side lying (side plank)

Raising positon.

High kneeling position.

Bear position

Squat position

Standing position

Figure 10

STATISTICAL ANALYSIS

The data was entered using Microsoft excel 2013, and it was analyzed using SPSS version 23.
The normality testing of data was done by Shapiro-wilk test.

Chest wall mobility – Comparison of pre-test and post-test scores of CHEST EXPANSION by paired sample Wilcoxon test.

Thoracic kyphosis – Comparison of pre-test and post-test scores of THORACIC KYPHOSIS by paired sample Wilcoxon test

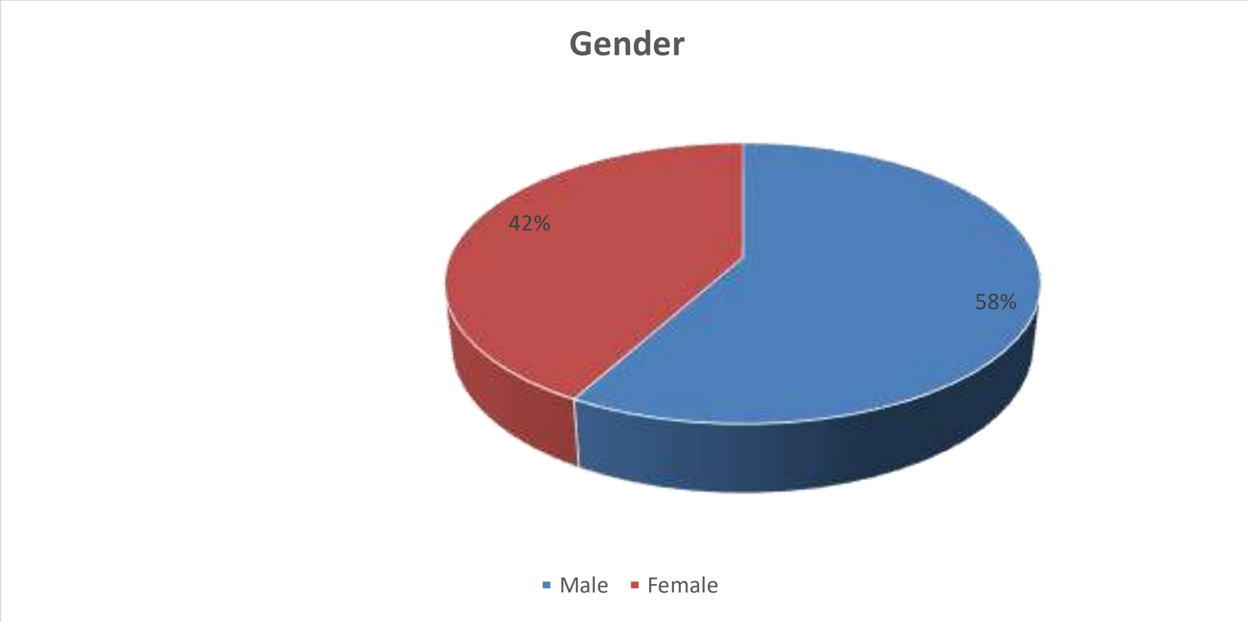
RESULTS

Normality test using Shapiro-Wilk

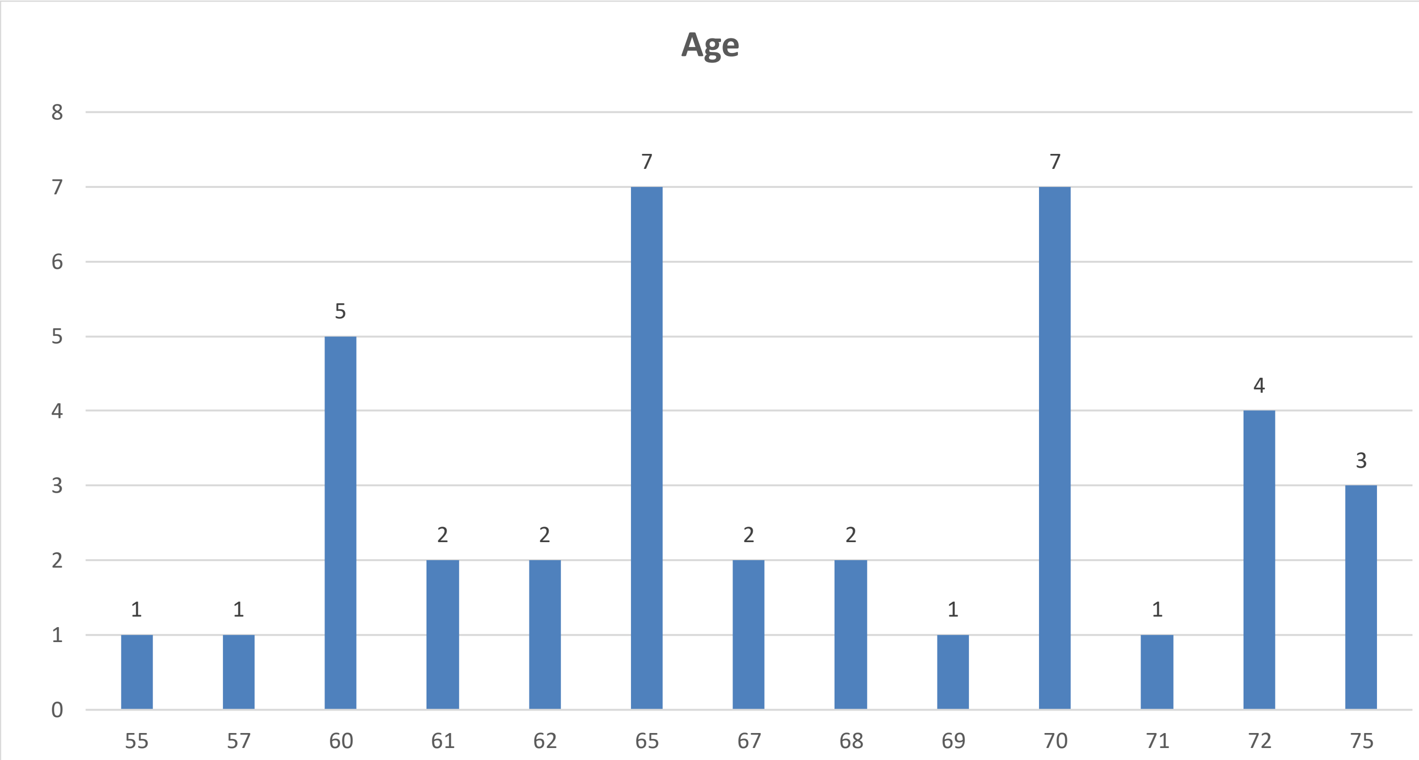
Variable	Time Frame	z-value	p-value
CHEST EXPANSION	Pre1	NA	NA
	Post1	NA	NA
	Pre2	0.856	0.000
	Post2	0.650	0.000
	Pre3	NA	NA
	Post3	NA	NA
THORACIC KYPHOSIS	Pre	0.938	0.035
	Post	0.942	0.049

Statistical analysis were performed by using SPSS 23, and as the sample size is less than 2000 so Shapiro-Wilk test used to identify the normality and found data do not follows normal distribution by ($P < 0.05$). Data set is not normally distributed as all the variables have indicated p-value less than 0.05 in the observation. The researcher shall use non-parametric test for data analysis purpose in the following sections. As the collected data is not normally distributed, to find out the pre and post changes Wilcoxon paired sample Test is used. $P < 0.05$ considered as statistically significant in the study (CI 95%).

Gender	Frequency	Percent
Male	22	58
Female	16	42

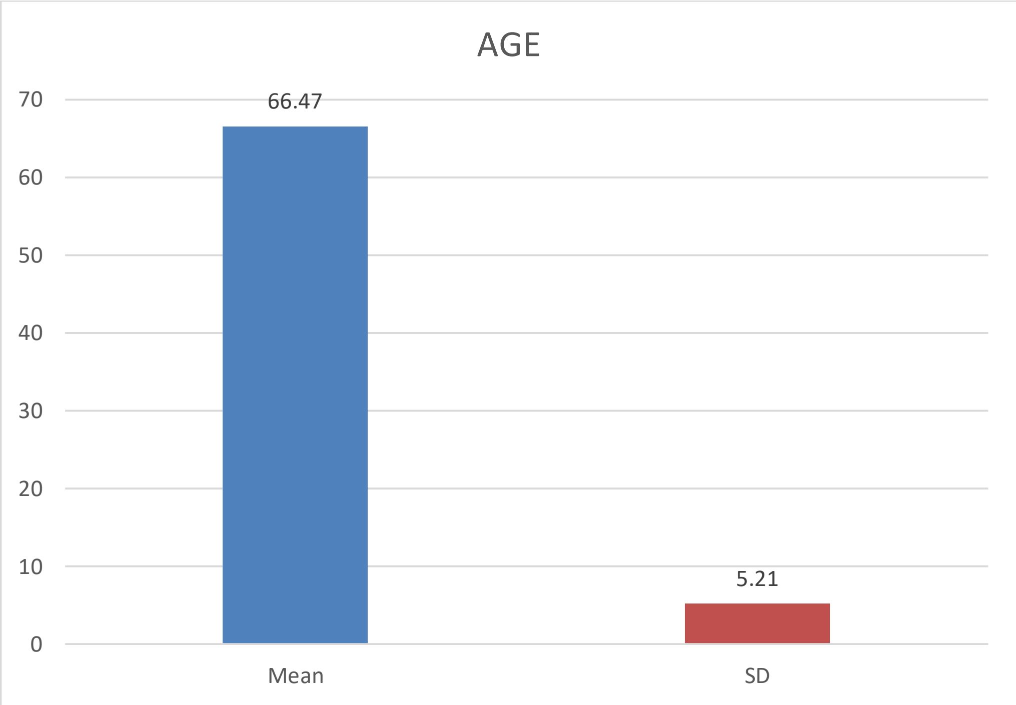


Age	Frequency	Percent
55.00	1	2.6
57.00	1	2.6
60.00	5	13.2
61.00	2	5.3
62.00	2	5.3
65.00	7	18.4
67.00	2	5.3
68.00	2	5.3
69.00	1	2.6
70.00	7	18.4
71.00	1	2.6
72.00	4	10.5
75.00	3	7.9
Total	**38**	**100.0**



Descriptive Statistics

Variable	Minimum	Maximum	Mean	SD
AGE	55.00	75.00	66.47	5.21



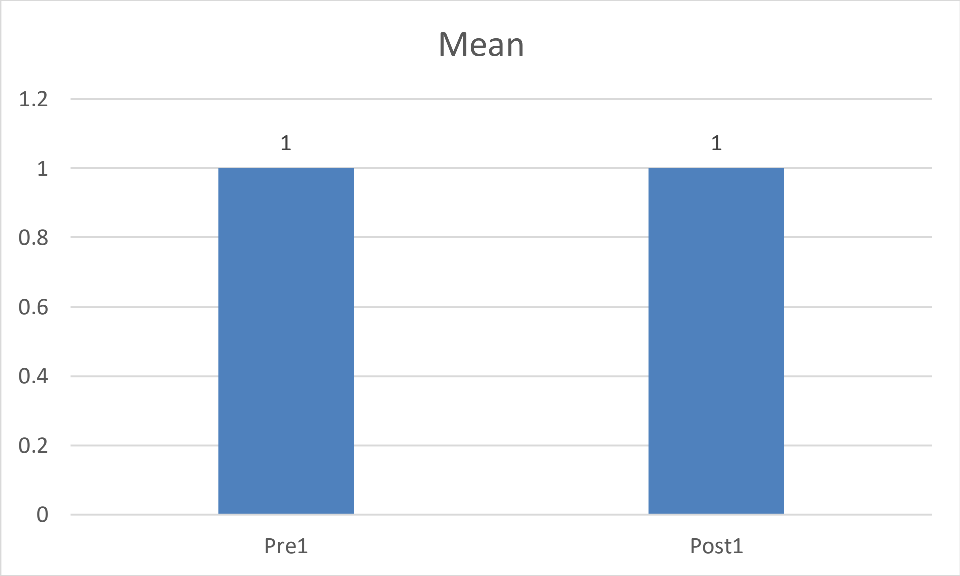
Within group Pre and post test

Table No.

Comparison of pre-test and post-test scores of CHEST EXPANSION by paired sample Wilcoxon test.

Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Pre1	1.00	0.00	NA	NA	NA	NA	0.001*
Post1	1.00	0.00					

The mean value indicated no changes post treatment so the effect of pre stage to post stage cannot be ascertained

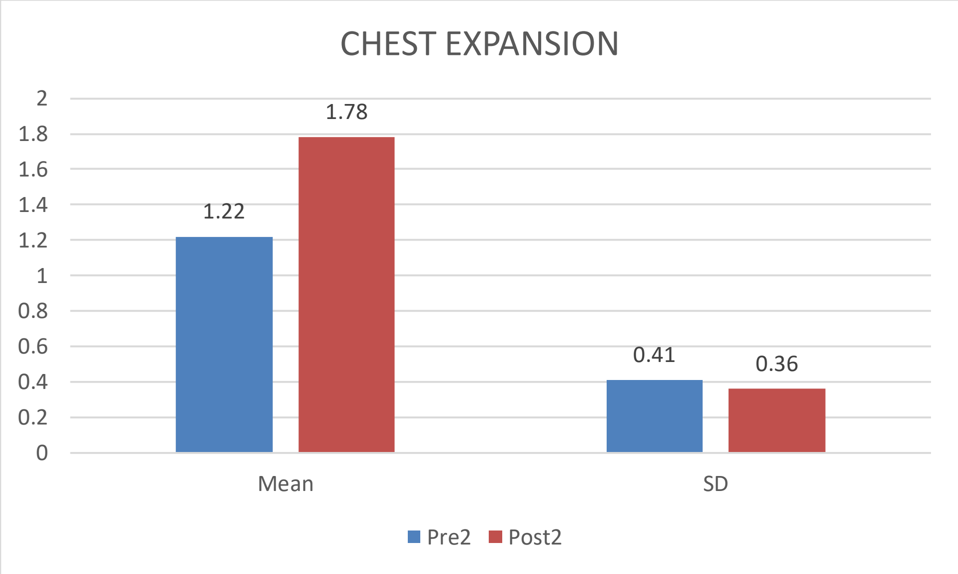


Within group Pre and post test

Comparison of pre-test and post-test scores of CHEST EXPANSION by paired sample Wilcoxon test

Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Pre2	1.22	0.41	0.56	0.44	1.26	4.743	0.001*
Post2	1.78	0.36					

The mean value indicated changes post treatment and higher values are recorded for post treatment outcome and also the standard deviation shows the consistency with post treatment value which is less to pre value. The effect size or Cohen's D indicates 1.26 value which is assumed to be very high in effect size as per the standard parameters of reference. Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. $0.001 < 0.05$) in the study and therefore it justifies the improvements in health outcome post intervention.

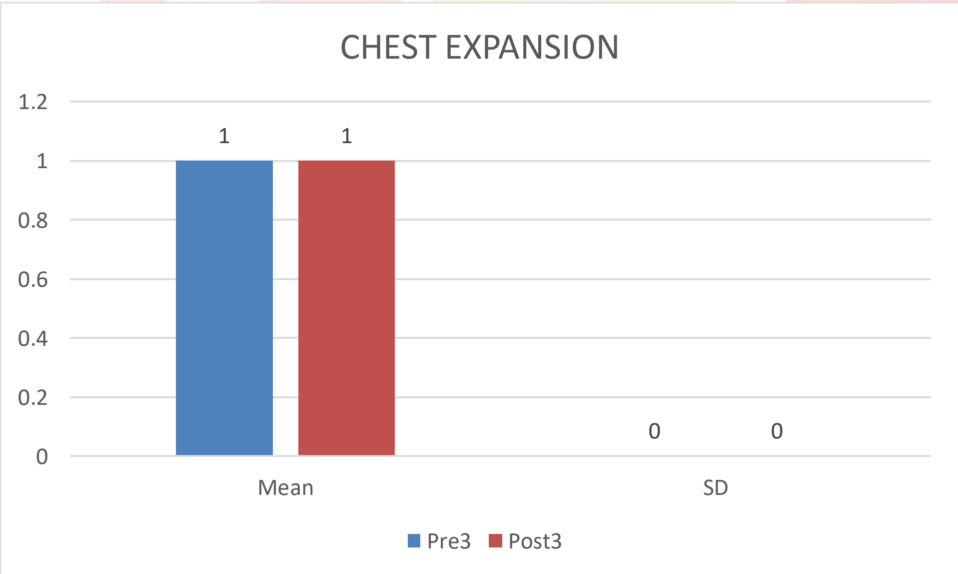


Within group Pre and post test

Comparison of pre-test and post-test scores of CHEST EXPANSION by paired sample Wilcoxon test

Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Pre3	1.00	0.00	NA	NA	NA	NA	0.001*
Post3	1.00	0.00					

The mean value indicated no changes post treatment so the effect of pre stage to post stage cannot be ascertained

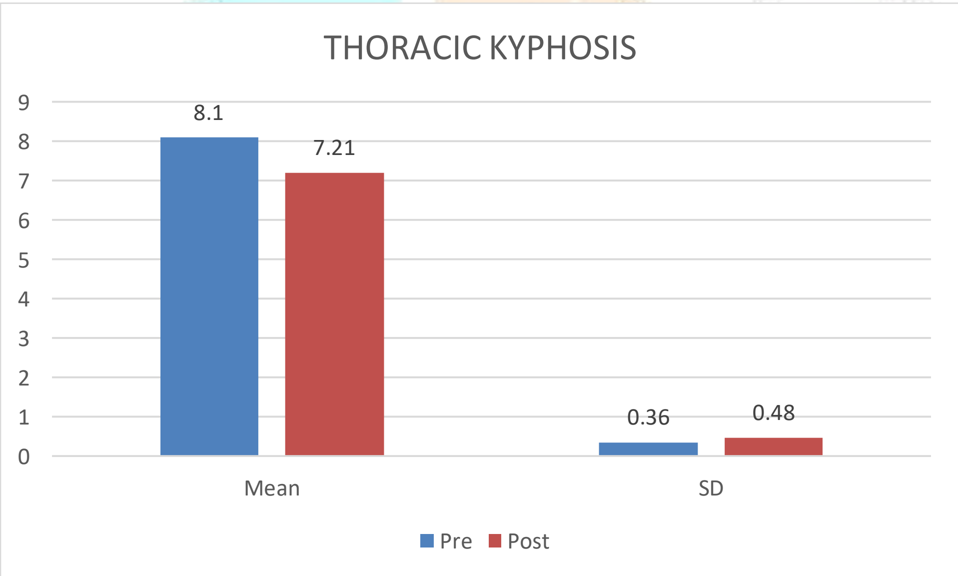


Within group Pre and post test

Comparison of pre-test and post-test scores of THORACIC KYPHOSIS by paired sample Wilcoxon test

Times	Mean	SD	Mean Diff.	SD Diff.	Effect size	z-value	p-value
Pre	8.10	0.36	0.89	0.41	2.14	5.385	0.001*
Post	7.21	0.48					

The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the limited consistency with post treatment value which is more to pre value. The effect size or Cohen's D indicates 2.14 value which is assumed to be very high in effect size as per the standard parameters of reference. Based on the results of the test analysis at 5% significance level, there is a significant statistical reliable difference between the pre & post treatment values with p-value is less than the 5% significance level (i.e. 0.001 < 0.05) in the study and therefore it justifies the improvements in health outcome post intervention.



DISCUSSION

The purpose of this study to investigate the effectiveness of DNS breathing technique on chest wall mobility and thoracic kyphosis in elderly people. As a result, chest expansion and thoracic kyphosis is significantly improved in participants.

Abe et al. (1996) reported that, the most important abdominal muscle for breathing, particularly during expiration, is the transverse abdominal muscle. The transverse abdominal muscle has been specifically targeted by DNS breathing exercises. One of the objectives of DNS breathing exercise is to increase intra-abdominal pressure, which results in the lumbar spine straightening, and is accomplished by activating the transverse abdominal, one of the main local stabilizers and respiratory muscles.[8] Furthermore, when the abdominal region has a good cylindrical shape and intra-abdominal pressure, the rib cage can be pressed upward rather than anteriorly flared, which will optimally allow the thoracic spine to extend. So, in this study 20 patterns of developmental kinesiology were used in the DNS breathing exercise, which involved deep diaphragmatic breathing and neutral lumbar posture in a range of positions. In order to coordinate and enhance appropriate breathing patterns through thoracic mobility, this intervention may thus be a useful strategy.

The respiratory system is one of the bodily systems that age-related changes and decreases will affect. The ribs in the chest stiffen with age, making breathing more difficult.[1]

This study evaluated the chest wall mobility at three levels: upper, middle and lower. Based on the experimental results, a significant enhancement in chest expansion was observed at both levels. But the mean value indicated no changes post treatment so the effect of pre stage to post stage cannot be ascertained.

The reason is that repetitive DNS deep breathing exercises were used in this study to align thoracic kyphosis and relieve rib cage stiffness, both of which were necessary for physiological stabilization. Patients with weak diaphragms or deep spinal stabilizers typically elevate their lower rib cage during inspiration as a compensatory breathing pattern because the position of the thoracolumbar spine directly affects the rib cage. According to the current study, breathing exercises in various DNS patterns appear to be able to provide appropriate trunk stabilization by allowing the rib cage to move independently, improving chest mobility and stimulating the trunk's muscle stabilizers.[8]

Thoracic hyper kyphosis is a common condition in the elderly and tends to worsen with age. It can also increase the risk of death and other health problems. In this study thoracic kyphosis is measured by C7WD.[10]
To enhance thoracic alignment and chest mobility, DNS breathing exercises were used in this study and results are indicated that these parameters had significantly improved. The post- intervention results were better than the pre-intervention in thoracic kyphosis (The mean value indicated changes post treatment and lower values are recorded for post treatment outcome and also the standard deviation shows the limited consistency with post treatment value which is more to pre value. A significant statistically reliable difference between the pre and post treatment values was found based on the test analysis results at the 5% significance level. The p-value for this difference was less than the 5% significance level, or $0.001 < 0.05$), which supports the improvements in the health outcome following the intervention.)

Thoracic stabilization can have a notable role in obtaining and maintaining upright alignment. The rib cage can move independently when the thoracic spine is erect, and the respiratory muscles can control posture and breathing pattern when the thorax is aligned.[8]

The use of DNS in this study has significantly improved the strategies for corrective exercise. One of the study's other strong points is that it is administered over the course of 36 sessions (18 of which are supervised exercise sessions and 18 of which are at-home exercise sessions), and it also includes participant education and breathing pattern correction during everyday activities.[6]

The Integrated Spinal Stabilizing System (ISSS), exact muscle timing, coordination, and breathing technique to have movement efficiency and breathing technique appear to be the main factors that improve thoracic kyphosis and chest wall mobility in DNS breathing exercises.[8]

Consequently, this approach can help to improve posture as well as the respiratory system, suggesting that this technique could be applicable to various population.

CONCLUSION

The study has shown that there is significant improvement in chest wall mobility and thoracic kyphosis in elderly people due to DNS breathing technique.

LIMITATIONS AND SUGGESTIONS

- **Limitations:**

  In this study taken only 55 to 75 age criteria included.

- **Suggestions:**

  Study can be done to compare male and female and also can be done on larger population.

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