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Effectiveness Of Sandbag Breathing Exercises In Mechanical Neck Pain

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ABSTRACT

Background: One of the most prevalent musculoskeletal disorders in the general population is chronic neck discomfort. It significantly affects a person's physical, social, and psychological well-being as well as the general standard of living of society. Chronic neck pain can be treated in several ways such as medications and exercises. The aim of this research is to check the effectiveness of sandbag breathing exercises in mechanical neck pain.

Objectives: Objectives are to investigate the effectiveness of sandbag breathing exercises in reducing pain and improving functional ability in patients with mechanical neck pain and to assess the impact of sandbag breathing exercises on cervical range of motion, strength and endurance in patients with mechanical neck pain.

Methods: This is a randomized controlled trial conducted on mechanical neck pain, 60 subjects who were divided into two groups; experimental and control.

Results: Results indicated that therapy was statistically significant in the outcome measures: Numerical Pain Rating Scale (1.43 and 4.96) and Neck Disability Index (14.33 and 21.46) for experimental and control group respectively.

Conclusion: The Sand Bag Breathing Technique significantly improved the parameters associated with mechanical neck pain, indicating that it could be employed as a treatment program for neck pain sufferers.

Keywords: *Sandbag, Breathing Exercises, Mechanical Neck Pain*

1. INTRODUCTION

In the general population, one of the most often reported musculoskeletal disorders is chronic neck pain. Both the individual's and society's overall quality of life are greatly impacted, as are the physical, social, and psychological facets of it. Around the world, 223 million people suffer from neck pain, and 22 million of them have an impairment that lasts for years. Pain and discomfort that is concentrated between the cervical spine, the superior nuchal line, and the spinous process of the first thoracic vertebra is referred to as mechanical neck pain.[1] Long-term use of poor posture can harm the ligaments. Additionally, it can affect proprioceptors in the muscles and ligaments and result in neck pain. Twenty minutes of using a smartphone with bad posture can cause cervical muscles, including the upper trapezius and cervical erector spinae muscles, to become fatigued. Furthermore, using a smartphone can significantly increase the stress on the cervical spine as the head flexes downward.[1] The basic pathology and pathogenesis of chronic neck pain remain unclear, despite the fact that it is a major cause of morbidity and disability in many nations, both in daily life and at work.[2]

Pain tends to impair the strength, endurance, motor control, and proprioception of the cervical muscles involved in breathing, including the sternocleidomastoid, anterior scalene, and trapezius. Reduced activation of the deep segmental muscles and increased activation of the superficial muscles are two examples of how neck discomfort can change the sequence and intensity of neck muscle activation.[2] Traditional physical therapy, education, general exercise, or manual therapy (spinal mobilization, manipulation techniques, and specific exercise) have all been used to treat patients with mechanical neck pain, but most patients plateau and do not fully recover from their symptoms. According to the available data supporting the respiratory dysfunction seen in mechanical neck pain patients, prior cohort research that included breathing treatment showed complete symptom resolution and an improvement in musculoskeletal and respiratory outcomes.[2]

The diaphragm is a small, dome-shaped muscle–tendon structure that is 2-4 mm thick and a vital dynamic muscle for breathing. Stone claims that because the diaphragm is so powerful and may malfunction anywhere from the head to the toe, it is one of the most astounding components of the body.[3] Diaphragmatic breathing (DB) re-education improves posture control by increasing the lung capacity and muscle power of the deep neck flexor muscles.[3] Scapulothoracic and upper extremity endurance training has a minor positive impact on pain at immediate post-treatment and short-term follow-up; combined cervical, shoulder, and scapulothoracic strengthening and stretching exercises have a small to large positive impact on pain at immediate post-treatment; and cervico-scapulothoracic and upper extremity strength training improves pain of a moderate to large amount both immediately post-treatment and at short-term follow-up.[4] In the neck pain individuals, average pain is closely associated with muscular tenderness and impairment (but not with range of motion or muscle strength). Strengthening the neck flexor muscles improved range of motion, strength, neck disability index, and discomfort, but not tenderness. [5]

Reduced maximal inspiratory and expiratory pressures, as well as decreased maximal voluntary ventilation (MVV), are other signs of compromised respiratory function that have been observed in some more recent investigations. Thus, these respiratory parameters were mostly linked to forward head posture and isometric neck extensor muscle strength. It was hypothesized that the following reasons could contribute to the respiratory dysfunction seen in individuals with chronic neck pain: a weakening in the deep neck flexor and extensor muscles, which would diminish the stability of the cervical and thoracic spine and alter the mechanics of the rib cage.[6] For those with neck pain, the Pilates approach has been suggested as a beneficial exercise regimen. The goal of the Pilates method, which was created by Joseph Hubertus Pilates, is to improve posture and body awareness via thorough physical training. Typically, it consists of two types of stretching and strengthening exercises: mat Pilates (exercises done on a mat without any special equipment) and Pilates apparatus exercises. Improving neck muscle motor control is the justification for treating patients with neck pain with the Pilates method.[7] It has been demonstrated that the Pilates method is effective in treating low back pain. Despite its widespread use in clinical settings, the evidence supporting the Pilates method's efficacy in treating neck discomfort has not been sufficiently compiled. The sole systematic review on the subject comprised non-randomized trials and failed to assess the degree of evidentiary certainty. This study's objective was to conduct a thorough assessment of the body of research on how the Pilates technique can help people with neck discomfort manage their pain and disability.[7]

Suboptimal indoor air quality (IAQ) has been linked to a higher incidence of neck and back pain, according to studies. However, conclusions regarding causality and the efficacy of the intervention were not possible because the majority of the available information came from lower-level studies. Others have discovered a correlation between Low Back Pain and neck discomfort and a number of breathing indicators, such as pulmonary function and respiratory diseases. However, not enough research has been done on how respiratory characteristics and IAQ relate to neck and back discomfort. Breathing disorders are linked to aberrant oxygen and carbon dioxide physiology as well as decreased functional movement quality, all of which are linked to an increased risk of Musculoskeletal disorders.[8] The body's capacity to filter air and recuperate can be improved by adopting better breathing habits, such as the light, slow, and deep technique and nasal breathing. However, there hasn't been a thorough investigation of the relationship between IAQ and respiratory parameters and neck and back discomfort.[8] The Sand Bag breathing technique improves the breathing pattern by providing resistance to the diaphragm for the breathing muscles, per earlier research. The study was conducted to show the impact of the Sand Bag technique on individuals with low back pain and its parameters since the diaphragm, which is a component of the core muscles, weakens in these individuals. [9]

When compared to asymptomatic persons, patients with Chronic neck pain exhibit decreased pulmonary function and respiratory muscle strength, which may have clinical significance. To support the findings of this meta-analysis, more longitudinal research and high-quality methodological investigations are required. Patients with persistent neck discomfort have been found to have respiratory impairment. Compared to people without symptoms, patients with persistent neck discomfort have a decline in pulmonary function and respiratory muscle strength. In the clinical setting of persistent neck pain, respiratory pattern disturbances should be taken into account.[10] The connection between CP and respiratory function is one of the areas that hasn't received much attention up to this point. Examining the respiratory function of CP patients appears to be crucial since it may significantly influence routine examination and treatment of these patients and result in more deliberate clinical judgments.[11] Although neck pain is very common, population estimates have not clearly identified its causes or risk factors. Non-catastrophic injury from a car accident, work-related event, sports-related event, or other degenerative conditions (e.g., secondary osteoarthritis of cervical facet joints or degenerative cervical myelopathy); lack of exercise; inflammatory and degenerative changes in the spinal discs, joints, ligaments, and nerves; neurological conditions and neoplasms; or other degenerative conditions are among the evidence-supported causes, which are multifactorial.[12]

2. MATERIALS AND METHEDOLOGY

Using data on the prevalence of mechanical neck pain, 60 participants (30 participants each in the group) were determined to be necessary. Inclusion criteria for recruitment were; mechanical neck pain, Individuals with mechanical neck pain, age above 20 years, both males and females and subjects willing to participate in this study. Exclusion criteria were: Age- below

20, individuals with radiculopathy and post-operative conditions, traumatic conditions and patients who are not co-operative. Subjects were recruited by simple random sampling method. The study population was selected from the outpatient department of physiotherapy of Krishna College of Physiotherapy, Karad India, diagnosed with mechanical neck pain. This study was approved by the Institutional Ethics Committee KVV, Karad. Subjects were informed about the study and if willing to participate and were asked to sign a written informed consent to participate in the study. Subjects were recruited based on inclusion and exclusion criteria and were divided into groups. After recording the demographic details (age, height, weight and BMI) and outcome measures like (Numerical Pain Rating Scale and Neck Disability Index). The outcome measures were recorded pre-therapy and post-therapy.

Intervention Pre-therapy intervention for both groups:

GROUP-A

- **Week 1:** Hot moist pack for 10 minutes and conventional physiotherapy

Sandbag breathing exercises using sandbag of 1kg, placing it over the abdomen. (10×3 repetitions)

- **Week 2:** Hot moist pack for 10 minutes

Sandbag breathing exercises using sandbag of 2kg, placing it over the abdomen.

(10×3 repetitions)

- **GROUP-B** will be given Hot moist pack for 10 mins and conventional physiotherapy treatment for 2 weeks.

3. RESULTS

Data was collected and tabulated in an Excel sheet. It was subjected to statistical analysis within and between groups. Within group analysis for outcome measures like Numerical Pain Rating Scale and Neck Disability Index and mentioned in Table 1, Figure 1and Table 2, Figure 2 for Group A and B respectively. Between groups analysis for outcome measures like Numerical Pain Rating Scale and Neck Disability Index and mentioned in Table 3, Figure 3 and Table 4, Figure 4 for Group A and B respectively.

Table 1 Numerical Pain Rating Scale and Neck Disability Index in Group A individuals

Group A			
NECK DISABILITY INDEX (NDI)		NUMERICAL PAIN RATING SCALE (NPRS)	
Pre	post	Pre	post
32.66	14.33333	7.56	1.43

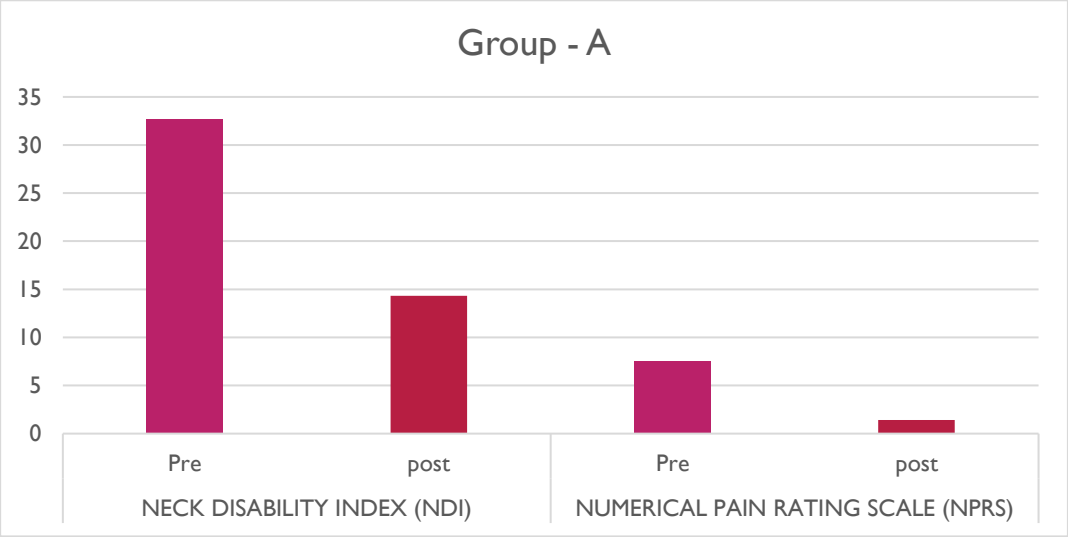

Figure 1. Numerical Pain Rating Scale and Neck Disability Index in Group A individuals

Table 2 Numerical Pain Rating Scale and Neck Disability Index in Group B individuals

Group - B			
NECK DISABILITY INDEX (NDI)		NUMERICAL PAIN RATING SCALE (NPRS)	
Pre	post	Pre	post
33.16	21.46	8.03	4.96

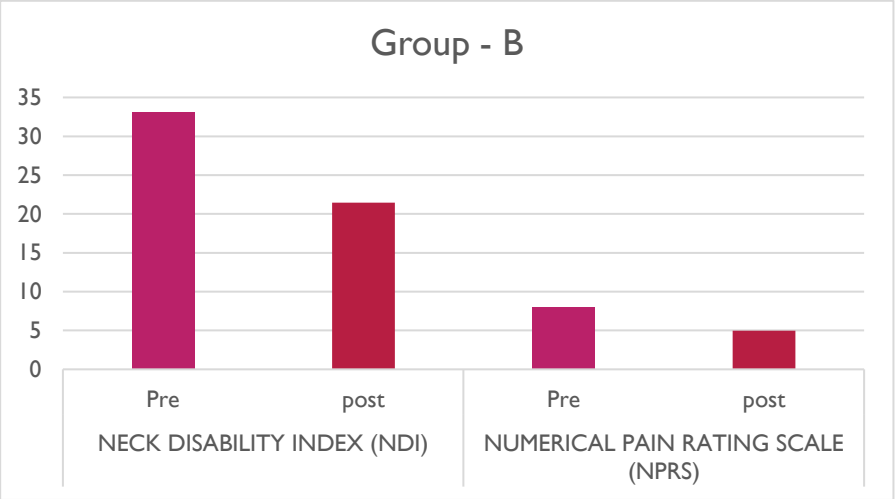

Figure 2. Numerical Pain Rating Scale and Neck Disability Index in Group B individuals

Table 3 Numerical Pain Rating Scale and Neck Disability Index between Group A and Group B (Pre therapy)

Pre therapy			
Group- A		Group- B	
Numerical Pain Rating Scale (NPRS)	Neck Disability Index (NDI)	Numerical Pain Rating Scale (NPRS)	Neck Disability Index (NDI)
7.56	32.66	8.03	33.16

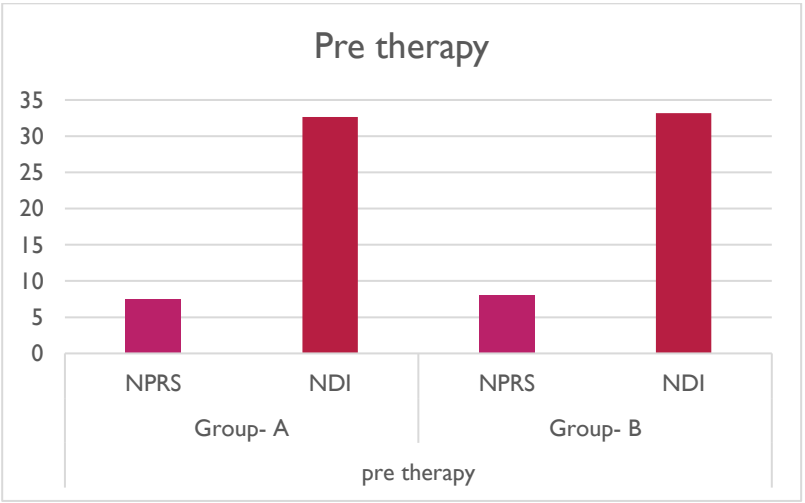

Figure 3 Numerical Pain Rating Scale and Neck Disability Index between Group A and Group B (Pre therapy)

Table 4 Numerical Pain Rating Scale and Neck Disability Index between Group A and Group B (Post therapy)

Post therapy			
Group- A		Group- B	
Numerical Pain Rating Scale (NPRS)	Neck Disability Index (NDI)	Numerical Pain Rating Scale (NPRS)	Neck Disability Index (NDI)
1.43	14.33	4.96	21.46

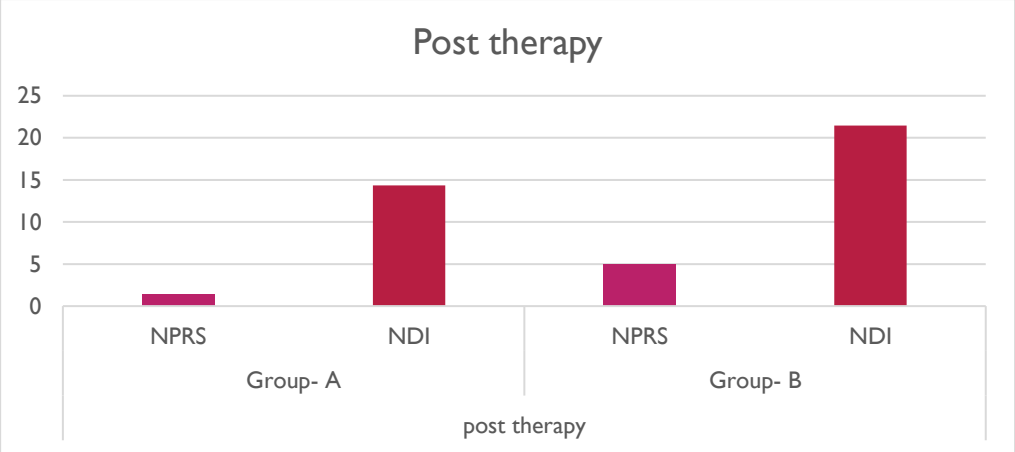

Figure 4 Numerical Pain Rating Scale and Neck Disability Index between Group A and Group B (Post therapy)

4. DISCUSSION

Using the Neck Disability Index (NDI) and the Numerical discomfort Rating Scale (NPRS) as outcome measures, the current study sought to assess the efficacy of the Sand Bag Breathing Technique in people with mechanical neck discomfort. Comparing Group A, which received the Sand Bag Breathing intervention, to Group B, which received a different or standard intervention, the results show a statistically significant reduction in both pain and functional impairment. Participants in Group A showed significant gains in both NPRS and NDI scores, according to within-group analysis. These findings imply that the intervention significantly improved neck-related functional limitations and decreased felt pain intensity. However, Group B also shown some improvement, albeit to a lower degree, suggesting that the Sand Bag Breathing group saw more noticeable therapeutic effects.

This finding is corroborated by the between-group analysis, which shows that Group A performed noticeably better than Group B on both outcome measures. This result lends credence to the idea that diaphragmatic-focused breathing with a sandbag may help ease neck pain and improve function by reducing cervical muscular tension, increasing relaxation, and improving postural awareness. The Sand Bag Breathing Technique's suggested mechanism most likely entails diaphragm activation and a decrease in auxiliary muscle overuse, which is typical in people with mechanical neck pain. Proprioceptive feedback from the sandbag's added weight may also promote improved cervical spine alignment and breathing patterns. These findings are consistent with earlier studies that emphasize the value of neuromuscular relaxation methods, core muscle activation, and breathing re-education in the treatment of persistent musculoskeletal pain. This is a new addition to the research, though, as few studies have explicitly looked at sandbag-assisted breathing in relation to mechanical neck pain. Despite these encouraging findings, there are a few things to keep in mind. It's possible that the sample size was tiny, which would have limited how broadly the results could be applied. Furthermore, there was no long-term follow-up, thus it is unknown how long the advantages will last. It is advised that these findings be confirmed and expanded upon in future studies using bigger populations and longer observation times. The study concludes by showing that the Sand Bag Breathing Technique is a successful non-pharmacological treatment for mechanical neck pain sufferers who want to lessen their pain and handicap. Using these methods in clinical settings may provide a low-risk, low-cost alternative to traditional physical therapy.

Few studies demonstrates that in addition to lowering discomfort, the Sand Bag breathing technique improves the breathing pattern by giving the diaphragm breathing muscles resistance. Since the diaphragm is a component of the core muscles and is weak in people with low back pain and the purpose of this study is to show how the Sand Bag technique affects people with low back pain and its parameters.

5. CONCLUSION

In terms of the outcome measures, the Neck Disability Index and the Numerical Pain Rating Scale, Group A demonstrated a substantial difference from the other groups. This indicates that the Sand Bag breathing technique lowers the Neck Disability Index Score indirectly in addition to reducing discomfort. Therefore, mechanical neck pain can be treated with the Sand Bag breathing technique.

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