

**EFFECTS OF STRETCHING & ISOMETRIC STRENGTHENING EXERCISES AMONG
TEACHERS FOR CHRONIC NECK & SHOULDER PAIN****¹Priyanka T. (MPT), ²Rachael Sarah Williamson (BPT) and ³P. Senthil Selvam (Phd)**¹Assistant Professor, School of Physiotherapy, VISTAS, Chennai, India.²Student, School of Physiotherapy, VISTAS, Chennai, India.³Professor, Head of the Department, School of Physiotherapy, VISTAS, Chennai, India.***Corresponding Author: Priyanka T. (MPT)**

Assistant Professor, School of Physiotherapy, VISTAS, Chennai, India.

Article Received on 29/03/2024

Article Revised on 19/04/2024

Article Accepted on 08/05/2024

ABSTRACT

Musculoskeletal disorders represent one of the most common and important occupational health problems in the working population. Among various occupational groups, school teachers have been reported to have a high prevalence of MSD, pain in the neck and shoulder region is the most common cause of morbidity and absenteeism from work in morbidity and absenteeism from work. And hence this study to find the effectiveness of stretching & isometric strengthening exercise among teachers with chronic neck and shoulder pain. 30 subjects were randomly divided into 2 groups. Group A 15 subjects experimental group & Group B 15 subjects control group. Group A stretching and isometric strengthening exercises everyday for 4 weeks and advice on lifestyle modifications and postural correction. Group B were advised to follow lifestyle modifications and postural changes were advised to them everyday for 4 weeks. Pre and post-test was measured with Numeric Pain Rating Scale [NPRS] and Neck disability index questionnaire [NDI] This study concluded that stretching exercises and isometric strengthening exercises along with lifestyle modifications to reduce chronic neck and shoulder pain and improve quality of life was more effective when compared with only lifestyle modifications for teachers experiencing chronic neck and shoulder pain.

KEYWORDS: Stretching exercises, Isometric strengthening exercises, Lifestyle modifications, Postural correction, NPRS [Numerical Pain Rating Scale], NDI [Neck Disability Index]

INTRODUCTION

Musculoskeletal disorders (MSD) represent one of the most common and important occupational health problems in the working population, being responsible for a substantial impact on quality of life and incurring a major economic burden in compensation cost and lost wages. Among various occupational groups, school teachers have been reported to have a high prevalence of MSD, with a prevalence rate between 40-95% with the various types of occupation related health disorders and MSD, pain in the neck and shoulder region is the most common cause of morbidity and absenteeism from work in many countries. Non-specific neck pain (NSNP) is the most common and 4th leading cause of MSD worldwide. It is estimated that about 70% of the population experience neck pain throughout the life, with an annual incidence of 15-50% and it is seen more commonly among middle aged females. Teachers experience musculoskeletal disorders due to their day-to-day activities. The work of a teacher does not only involve teaching students, but also preparing lesson plans, assessing student's grades and activities, being involved

in extracurricular activities like sports, science and craft exhibitions, field trips, outreach programs, cultural programs and also participating in various school committees, which may cause them to suffer adverse mental and physical health issues due to variety of job functions. The NSNP is described as pain present in the anatomical region of the neck without radiating to the upper limb. It is also defined as the pain in the posterior region of the neck from the superior nuchal line to the spine of the scapula and the side region down to the superior border of the clavicle and the suprasternal notch.

MATERIALS AND METHODS

It is a Randomized control trial done among the school teachers to find the effects of stretching and isometric strengthening exercises for chronic neck and shoulder pain. A total of 30 members were selected based on inclusion criteria; they were divided into 2 groups, with each group containing 15 members.

INCLUSION CRITERIA

- AGE: 35-45 years
- GENDER: Females
- Neck and shoulder pain for more than 3 months.
- A moderate to severe (Grades 7 - 9) grade on the Numeric Pain Rating Scale.
- A mild to moderate score on the Neck Disability Index.
- A Moderate score on the Shoulder Pain and Disability Index.

EXCLUSION CRITERIA

- Any pathological conditions like spondylosis, ankylosing spondylitis, any type of arthritic conditions.
- Malignancy around the neck and shoulder region.
- Spinal deformities.
- Recent fractures.
- Recent surgeries relating to the neck and shoulder region.

Among 30 samples 15 will be assigned for stretching and isometric strengthening for the neck along with lifestyle modifications and postural changes and 15 will be assigned for lifestyle modification and postural changes.

GROUP-A (experimental group) were taught exercises on both stretching and isometric strengthening for neck and shoulder along with lifestyle modifications and postural advice for 6 days per week for 4 weeks.

GROUP-B (control group) were advised on lifestyle modification and postural changes for 4 weeks.

STUDY PROCEDURE

The teachers were provided with the Numeric Pain Rating Scale and were asked to circle the pain rating between the grades 0 -10. Along with NPRS they were provided with the NDI and SPADI Questionnaire and were asked to fill them. The criteria of the questionnaire was explained to the participants.

**GROUP-A (Experimental Group)
NECK & SHOULDER STRETCHING****1. NECK FLEXION STRETCH**

- Move the neck slowly towards the chest and look downward while only
- moving the head.
- Once the head has been flexed forward, hold the stretch for 30 seconds before
- returning to the initial position.
- The deep neck extensors and the muscles that run along the back are stretched.

2. SIDE ROTATION STRETCH

- The head should be squarely over the shoulders and the back should be straight.

- Slowly turn the head to the left until the stretch is felt on the side of the neck and shoulder.
- Hold the stretch for 10 seconds and repeat 3 times.
- Repeat the same on the right side.

3. SIDE TILT

- Smoothly tilt the head towards the left shoulder and try to touch it with ear
- Stop when the stretch is felt and do not elevate the shoulders.
- Hold the stretch for 10 seconds and repeat 3 times.
- Repeat the same on the right side.
- The upper trapezius muscle is stretched.

4. LEVATOR SCAPULAE STRETCH

- Place one arm behind your back for support and use the other to pull the head downward & towards the opposite side.
- The stretch is felt down the side of the neck into the shoulder blade region.
- Hold the stretch for 30 seconds and repeat 3 times.

5. CERVICAL NODDING

- Nod your head down towards your Adam's apple and hold for 5 seconds.
- Release and extend your neck backwards until a stretch is felt on your anterior neck muscles.
- Repeat this movement 10 times on either side of the neck.

6. SHOULDER ELEVATION

- The head should be squarely over the shoulder and the back should be straight.
- Slowly elevate the shoulders upwards and hold for 30 seconds and slowly depress the shoulders..
- Repeat this movement 5 times
- In this movement the levator scapulae, upper trapezius and the lower trapezius muscles are activated.

7. SHOULDER ROLLS

- Move the shoulders straight up and move them in a circle clockwise 15 times
- Repeat the same movement anti-clockwise 15 times.
- The trapezius and the deltoid muscles are targeted during this exercise.

8. SHOULDER ABDUCTION

- The head should be squarely over the shoulder and the back should be straight.
- Slowly elevate your arms sideways completely over your head and bring them down back to position.
- Repeat the movement 5 times.

ISOMETRIC STRENGTHENING**1. CERVICAL FLEXORS**

- Bend the neck slightly forward & put the hand on forehead.

- Try to bend the head forward while pushing back with the hand.
- Hold the exercise for 20 secs & relax for 5 secs.

2. CERVICAL EXTENSORS

- Keep the chin up & neck straight & place the hands at the back of head.
- Try to push your head backwards while pushing forward with your hands.
- Hold the exercise for 20 secs & relax for 5 secs.

3. CERVICAL SIDE BENDING

- Keep the head straight and the chin level.
- Put your right hand on the right side of the head.
- Try to bring the head down to the right shoulder while pushing up with your right hand.
- Repeat the same on the left side.
- Hold the exercise for 20 secs & relax for 5 secs.

4. CERVICAL ROTATORS

- Put your right hand on the right side of your face at chin level.
- Turn the head to the right while pushing it back with your right hand.
- Repeat the same on the left side.
- Hold the exercise for 20 secs & relax for 5 secs.

LIFESTYLE MODIFICATION

1. STAY HYDRATED

- Many health benefits can be gained from drinking an adequate amount of water.
- One of them includes maintaining the mobility of the spine.
- The spinal disc is 80% water and they help in absorbing the stress that is put on the spine while accomplishing daily tasks.

2. IMPROVE WORKPLACE ERGONOMICS

- Maintaining an optimal posture while sitting, standing and taking class.
- Improve neck posture while preparing lesson plans, reading and assessing mark sheets by setting up a workstation with height modifying tables and chairs with neck and arm support.
- Balancing their weight equally while standing for long hours during exam monitoring and using blackboards.

3. USE GADGETS WITH DISCRETION

- With the advancement of technology; e-learning & teaching has become quite common.
- Teachers are advised to use their smartphones and computers at their eye level.

4. CHECK THE SLEEPING POSITIONS

- Sleep on your back with a thin pillow under the knees.
- On side lying use a pillow between the knees.

5. CHECK THE SPINAL ALIGNMENT

- Proper alignment of the spine can reduce stress and strain on the soft tissues of the neck.

GROUP - B (Control Group)

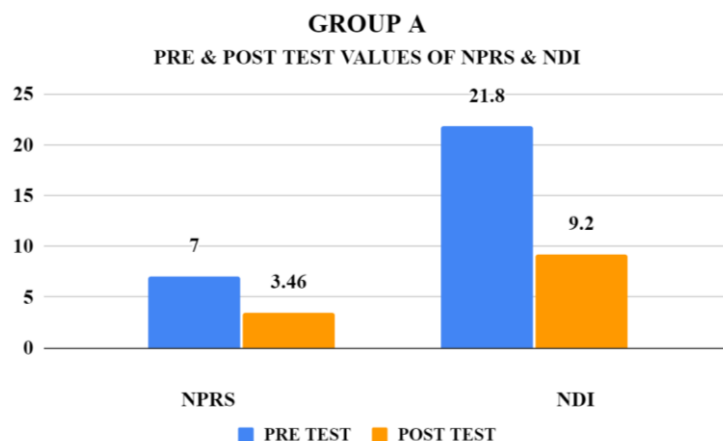
Lifestyle modifications and postural changes were advised to the teachers of this group and were asked to follow them for 4 weeks.

DATA ANALYSIS

A total of 30 samples were enrolled in this study. The pain was measured by NPRS and questionnaire based on NDI GROUP A (Experimental Group)

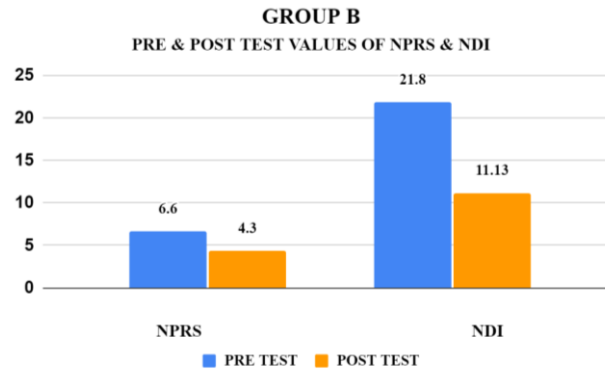
TABLE 1: Comparison Between The Pre And Post Test Values of NPRS and NDI For Group A & Group B.

GROUP A	MEAN VALUE		STANDARD DEVIATION		t - VALUE	p - VALUE
	PRE TEST	POST TEST	PRE TEST	POST TEST		
NPRS	7	3.46	0.7559	1.1872	9.7415	<0.000
NDI	21.8	9.2	1.8593	1.8973	18.3702	<0.000



GROUP B (Control Group)**TABLE 2: Comparison Between The Pre And Post Test Values of NPRS and NDI For Group A & Group B.**

GROUP B	MEAN VALUE		STANDARD DEVIATION		t - VALUE	p- VALUE
	PRE TEST	POST TEST	PRE TEST	POST TEST		
NPRS	6.6	4.3	1.2421	1.15886	4.4174	<0.000
NDI	21.8	11.13	2.3664	3.7959	9.2385	<0.000

**RESULT**

In this study, data showed a statistical significant difference existing in the intervention given to the experimental and control group. It demonstrated that subjects with chronic neck and shoulder pain receiving stretching exercises for neck and shoulder and isometric strengthening exercises for the neck experienced a significant change in their pain reduction and an improvement on their work life abilities when compared with subjects receiving only lifestyle modification and postural changes. In Table 1, the pre and post test values of the Numeric Pain Rating Scale(NPRS) and The Neck Disability Index(NDI) of Groups A has shown a baseline of significant difference. In Table 2, the pre and post test values of the Numeric Pain Rating Scale(NPRS) and The Neck Disability Index (NDI) were calculated and a significant difference was noticed in Group B. In Table 3, Group A showed a mean value of 3.46 and 9.2 in NPRS & NDI respectively when compared with post test mean values of Group B for NPRS &NDI.

DISCUSSION

Musculoskeletal disorders (MSD) represent one of the most common and important occupational health problems in working populations. School teachers, in general, have been demonstrated relative to other occupational groups, to report a high prevalence of MSD, with prevalence rates between 40% - 95%, states the study on a systematic review of musculoskeletal disorders among school teachers by Erick and Smith.. A study by Temesgen et al, on Burden of shoulder and/ neck pain among school teachers in Ethiopia has shown that the prevalence of neck and shoulder pain among teachers was 66.7%, and a combined case of upper back, shoulder and neck MSD showed a prevalence rates of 52.6%, 52.5% and 50.8% respectively in a cross sectional study of Botswana school teachers. This study revealed that performing neck and shoulder stretching and isometric neck strengthening exercises for 4

consecutive weeks significantly alleviated neck and shoulder pain along with work life disability among teachers with chronic neck and shoulder pain. A randomised trial was conducted among the female school teachers with chronic neck and shoulder pain based on the evidence of previous prevalence. Teachers were assessed for the severity of the pain and disability using the Numeric Pain Rating Scale (NPRS) and Vernon. H Neck Disability Index (NDI), later they were put into two groups, Group A (Experimental Group) and Group B (Control Group). A control group was included to optimise the effects of the exercise intervention when compared with regular health promotional activities or no exercises. The experimental group (15 teachers) were advised to follow a series of stretching and isometric strengthening exercises everyday for 4 weeks and advice on lifestyle modifications and postural changes was briefed. The control group (15 teachers) were advised to follow only the lifestyle modifications and postural changes that were advised to them everyday for 4 weeks. Since neck pain and disability tend to be recurrent, exercise therapy as a therapeutic approach was considered. Duane Knudson's study on the biomechanics of stretching briefed the importance of stretching as a therapeutic modality and its effectiveness on various stretching programs; the tension created by the skeletal muscle can be classified as two mechanical source: active and passive and it shows acute effects by a significant increase in the joint ROM which is mostly due to the increased stretch tolerance and a significant reduction in all forms of muscular performance. A chronic effect of increasing the ROM but also tends to increase passive tension of the muscle. A study by Yang et al, concluded that the practice of isometric strength training for neck and shoulder pain resulted in an improvement in pain symptoms, improves the neck dysfunction and joint mobility with a reduction in the degree of neck pain, dysfunction and limitations in ROM in three different planes. After 4 weeks, a post

intervention test was conducted for both groups on a definite date using the NPRS and NDI questionnaire. The post intervention test values were calculated and statistically graphed. The data resulted in showing a significant difference between the two groups allowing Group A to show greater improvements in neck and shoulder pain along with their work life disabilities.

CONCLUSION

This study concluded that stretching exercises for neck and shoulder and isometric neck strengthening exercises along with lifestyle modifications to reduce chronic neck and shoulder pain and improve quality of life was more effective when compared with only lifestyle modifications for teachers experiencing chronic neck and shoulder pain.

REFERENCE

1. Patience. N.Eric, Derek.R.Smith. A systematic review of musculoskeletal disorders among school teachers. *BMC Musculoskeletal Disorders*, 2011; 12: 260.
2. Melaku Temesgen, Gashaw Belay, Asmare Gelaw, Balamurugan Janakiraman, Yaregal Animut. Burden of shoulder and neck pain among school teachers in Ethiopia. *BMC Musculoskeletal Disorders*, 2019; 20: 18.
3. Jamie Guzman, Eric Hurwitz, Linda.J, Scott Haldeman, Pierre Cote, Carragee.J, et al. A new conceptual model of neck pain. *Eur Spine J*, 2008; 33(4S): S14-S23.
4. Lars Anderson, Klaus Hansen, Ole Mortenson, Mette Zebis. Prevalence and anatomical location of muscle tenderness in adults with NSNP. *BMC Musculoskeletal Disorders*, 2011; 12: 169.
5. Tunwattanapong. P, Kongkasuwan.R, Kuptniratsaikul.V. The effectiveness of a neck and shoulder program stretching exercise program among office workers with neck pain: a randomised controlled trial. *Clinical Rehabilitation*, 2015.
6. Jiaqi Yang, Min Yang, Qinqin Lin, Jie Fu, Rui Xi. Effects of isometric training on treatment of patients with neck pain. *Medicine*, 2022; 101: 39.
7. Duane Knudson. The biomechanics of stretching. *Journal of exercise science & physiotherapy*, 2006; 2: 3-12.
8. Euasobhon.P, Atisook.R, Bumrungratudom.K, Zinboonyahgoon.N, Saisavoey.N, Mark Jensen. Reliability and responsibility of pain intensity scales in individuals with chronic pain. *PAIN.*, 2022; 163: 12, e1184-e1191.
9. Hanniel Lim, Clinphys.M, Zhi Tang, Masayu Hashim, Yang.M, Eileen Koh, Kim Koh. Cross cultural adaptation, reliability, validity & responsiveness of the simplified version of NDI. *Spine*, 2019; 45(8): 541-548.
10. David Venturini, Gabriele Giannotta, Leonardo Pellicciari, Alex Rossi, Dennis Pennella, Michela Goffredo, Antonio Poser. Reliability and validity of the Shoulder Pain and Disability Index in a sample

of patients with frozen shoulder. *BMC Musculoskeletal Disorders*, 2023; 24: 212.