

Effect of Static Neck Exercises on Neck Pain for School Students Attending Online Classes

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Abstract

Neck Pain is a very common musculoskeletal condition that is becoming a major cause of concern not only in adults but also in the younger population. The aim of the study is to find out if providing static neck exercises has any effect on reducing neck pains. The study comprised of 40 participants which included both males and females of ages 14-19 years having mechanical neck pain. A baseline assessment was carried out using NPRS and NDI scales to select participants for the study. Once participants met the inclusion criteria, they were given static neck exercises for 1 month (three days in a week: 2 sets with 10 repetitions each). Later, post NPRS and NDI readings were collected and compared with the pre NPRS and NDI readings to find any changes in neck pain. Both pain and neck disability had shown statistical changes when pre and post readings of NPRS and NDI were compared. Hence, this study has shown that static neck exercises, are effective means of reducing neck pains.

Keywords: mechanical neck pain; static neck exercise; school students; NPRS; NDI.

Introduction

Neck pain is a musculoskeletal condition that is day by day becoming a major cause of concern especially in the young population. It can also be referred to as cervical pain (that is pain occurring between the C1 and C7 cervical region. In the early stages it can happen occasionally or frequently due to our day-to-day activities or sometimes due to our wrong posture. It's usually not a sign of major concern, as it can be relieved with rest and medications such as oral tablet/ topical medication (e.g. ointments) in a few days.

But sometimes due to various factors, it may prevail for a longer time. This can happen if the individual has previously faced any injury, trauma, illness. In this case, it may require serious medical care. Sometimes neck pain may come with other problems such as any nerve compressions that may cause pain radiating to shoulder and arms etc. Therefore, early management and intervention is important to prevent any other difficulty which can occur due to neck pain.

According to world-health-organisation neck pain is considered the 4th most leading cause of health problems. Analytics and data suggest that

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approximately 5 to 87% of normal population experience pain in neck. Additionally other studies have shown that it is a cause of concern for disability in children between ages 14-20 years old. Studies also suggests that pain in neck and shoulders is leading cause of concern and is very commonly seen in young children & teenager students especially in developing countries.¹

Neck pain can range in the following categories. It can be least troublesome to an individual or it can also be the one affecting the individual the most; it can be so troublesome that it can interfere with the day-to-day activities of a person. Also, certain movements can aggravate the pain.

*Symptoms:*²⁻⁶

- Pain: can be because of exaggerating activities that may cause too much load on neck causing pain. It can become confined at an area, so person might feel sharp or pin-pricking needle type pain.
- Tingling: can be seen in cases when the neck pain is radiating down to the shoulders, arms, trunk. It may give a sensation of numbness. This can be seen in case of nerve compressions where individual complains of burning-sharp pain travelling down their arm. Further leading to a feeling of weakness.
- Feeling of tightness/ discomfort/ in neck.
- Unable to move neck in all directions completely.
- Headache.
- Soreness in muscle.
- Feeling of heaviness in neck and shoulders.

*Causes:*²⁻⁶

- Overuse of the muscles by working for long hours on computers and smartphones, causes strains, a hunched back, inappropriate posture.
- Any injury/ trauma such as whiplash injury to cervical spine or degeneration of disc or vertebra.
- Other pathological conditions like osteoarthritis in neck, herniated disc in cervical region can cause chronic neck pain.
- Stresses like anxiety, social factors.

- Infections such as meningitis, any tumours in the spine can disrupt the tissues around the joint, hence, pressing on the nerve; example- rheumatoid arthritis, spondylolisthesis, osteoporosis, weakened bones further causing fractures.

*Risk factors:*²⁻⁶

- Age: degeneration occurs as one gets old causing pain in muscles and bones.
- Long working hours which causes stress on neck muscles.
- Improper or poor posture.
- Any previous muscular or bone related injuries.
- Weak neck muscles.
- Intense working environment.

Neck pain is now also seen as an after effect of the covid-19 pandemic. This is because all schools, institutions, workplace business had to shift to online mode of learning and working by students and teachers' & other profession persons due to social distancing and precautions to avoid the spread of virus.

Publications and articles have stated that this remote way of learning and working has greatly impacted the health of students and adults. Previous studies stated, students have been suffering from neck pain, eye pain and headache. This long duration of hours of working and studying on laptops, computers, smartphones has greatly impacted students physical and mental health.

Therefore, the focus of this study is to find out if providing static neck exercises to school students who attend online classes, will help reduce their neck pain/ discomfort or not.

Need of the study:

This study will provide an insight for clinician fraternity as we will come to know the effective physiotherapy intervention for treating neck pains of mechanical type. It will also provide insight to patient fraternity as the treatment protocol is time and cost efficient.

Aim

To find out the effect of static neck exercise on neck pain for school students attending online classes.

Objective

1. To determine the effectiveness of static neck exercises on Numeric pain rating scale (NPRS) in neck pain cases.
2. To determine the effectiveness of static neck exercises on Neck Disability Index scale (NDI) in neck pain cases.

Hypothesis:

Null hypothesis: There will be no significant effect of static Exercises for Neck pain and disability in neck pain cases.

Alternate hypothesis: There will be significant effect of static neck exercises on neck pain and disability in neck pain cases.

Methodology

- Study Design: Intervention study.
- Study Population: school students with neck pain from attending online classes.
- Study Setting: Dr. Talwar's Physiotherapy Clinic.
- Sampling: non-probability sampling.
- Sample Size: 40 cases of mechanical neck pain
- Selection Criteria:
 - Inclusion Criteria:^(8 and 1)
 - ⇒ School students of age group between 14-19years.
 - ⇒ Students who attend online classes.
 - ⇒ Students with those complaining of neck pain.
 - ⇒ Bothe males and females.
 - ⇒ Mechanical neck pain with less than 3 months duration.
 - Exclusion Criteria:^(7,8,1)
 - ⇒ neck pain due to myelopathy, atlantoaxial subluxation, and metastases.

- ⇒ Cervical spondylosis.
- ⇒ Participants having neck-pain which chronic.
- ⇒ Participants who are not school or high school students or teenagers.

➤ Outcome Measures:

- ⇒ Numeric pain rating scale (NPRS).
- ⇒ Neck disability index (NDI).

➤ Procedure:

Participants who met the inclusion criteria were selected and baseline assessment was done using the NPRS and NDI scales. The exercise protocol was carried out for 1 month. The following mentioned exercises were performed by the participants for three days in a week: 2 sets with 10 repetitions each. These were performed by participants themselves.⁽⁸⁾

Once the 4-week exercise session was completed, Post NPRS and NDI readings were collected and tabulated to find any changes in neck pain.

- Exercise Procedure: Patient position: patient should be seated comfortably with shoulders relaxed. An upright position is to be maintained throughout the exercise protocol.
- 1. **Static Neck flexion:** patient was instructed to place their hands on the forehead. Next, while maintaining normal breathing & posture, press the forehead against the palm of your hand in forward direction. This was to be done 20 times. Relax and take a 10 sec break between each set.



Figure 1

- Static Neck extension:** patient was instructed to place the towel behind their head and to hold and maintain the position. Patient was asked to press in the backward motion against the towel while maintaining the towel pull in forward direction. This was to be performed 20 times.



Figure 2

- Static Side neck flexion:** patient was asked to wrap a towel around the head. For right side neck flexors, the patient will press onto the right side of towel while maintain the towel pull in opposite direction. Similarly, it should be performed for left side. 20 repetitions each for left and right side.

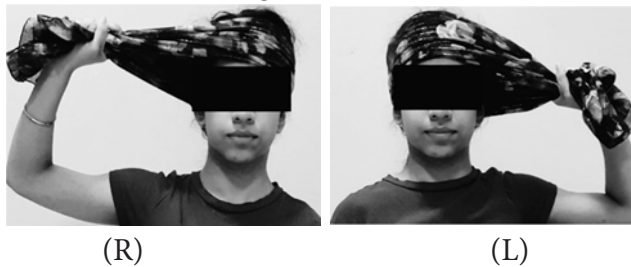


Figure 3

- Static Neck rotations:** patient was instructed to place the palmer side of the hand onto their cheek. For right side neck muscle rotators patient will place their hand onto right cheek. While maintaining this posture they must try to rotate the neck to the right side. Similarly, it should be performed for left side as well. 20 repetitions each.

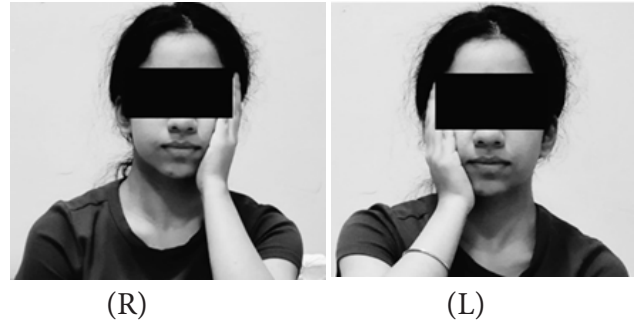


Figure 4

Table 1: NPRS Observation Table

S. No.	Pre-Exercise NPRS scale values	Post Exercise NPRS scale values
1.	6	4
2.	4	3
3.	6	5
4.	6	4
5.	8	5
6.	8	4
7.	4	3
8.	4	4
9.	7	6
10.	5	4
11.	7	6
12.	6	5
13.	5	5
14.	6	4
15.	4	3
16.	7	4
17.	3	3
18.	6	5
19.	3	3
20.	4	3
21.	4	2
22.	6	4
23.	6	5
24.	6	6
25.	5	4

S. No.	Pre-Exercise NPRS scale values	Post Exercise NPRS scale values
26.	5	5
27.	10	8
28.	7	5
29.	6	5
30.	6	4
31.	5	4
32.	4	4
33.	9	7
34.	6	5
35.	5	3
36.	3	3
37.	6	5
38.	10	9
39.	5	4
40.	7	5

Table 2: NPRS Calculations

	Before exercise	After exercise
Mean	5.75	4.5
Median	6	4
Mode	6	4
Range	7	7
Minimum	3	2
Maximum	10	9
Count <i>n</i>	40	40
Sum	230	180
Standard Deviation:	1.7059473644449	1.3959648809042

P(T<=t) one-tail is 0.00029127

t Critical one-tail is 1.664624645

Therefore, p< .001

Table 3: Neck Disability Index Observation Table

S. No.	Age	Gender	Pre Exercise score	Final % score	Post exercise score	Final % score
1.	16	Male	3	6	3	6
2.	16	Male	4	8	4	8
3.	16	Female	17	34	13	26
4.	18	Female	15	30	11	22
5.	16	Female	8	16	6	12
6.	15	Female	12	24	9	18
7.	19	Female	9	18	7	14
8.	17	Male	6	12	6	12
9.	15	Female	19	38	15	30
10.	15	Female	17	34	14	28
11.	15	Female	16	32	14	28
12.	18	Male	17	34	15	30
13.	18	Male	15	30	11	22
14.	17	Male	11	22	9	18
15.	17	Male	20	40	16	32
16.	18	Male	2	4	2	4
17.	17	Male	4	8	4	8
18.	18	Female	20	40	17	34
19.	16	Male	10	20	8	16
20.	18	Male	10	20	7	14
21.	15	Female	12	24	10	20
22.	15	Female	16	32	14	28

S. No.	Age	Gender	Pre Exercise score	Final % score	Post exercise score	Final % score
23.	16	Female	4	8	3	6
24.	16	Female	14	28	12	24
25.	15	Female	7	14	7	14
26.	16	Female	7	14	6	12
27.	16	Female	6	12	5	10
28.	18	Male	22	44	19	38
29.	17	Female	24	48	20	40
30.	17	Female	10	20	9	18
31.	18	Male	4	8	4	8
32.	16	Female	8	16	5	10
33.	16	Male	22	44	20	40
34.	18	Female	13	26	10	20
35.	18	Male	8	16	6	12
36.	19	Male	5	10	5	10
37.	15	Male	7	14	6	12
38.	16	Male	27	54	22	44
39.	17	Male	5	10	3	6
40.	18	Male	14	28	13	26

Table 4: Mean % Difference Among Ndi Scores:

	Pre NDI %	Post NDI %
Total Number of Participants	40	40
Mean NDI %	23.5%	19.5%

P(T<=t) one-tail is 1.7105E-11

t Critical one-tail is 1.68595446

Therefore, $p < .001$

Results and Observations

The above static exercise protocol for neck pain has shown significant difference in results. Pain and NDI both have shown statistical differences.

The mean of pain before giving exercise was 5.75; after the exercise regimen the mean for pain was reduced to 4.5.

Paired t-test tool was carried out to assess the “Pre- and Post” results of NPRS and NDI. This has shown a significance of $p < .001$.

Though neck disability is not majorly present in the participants. However, some percentage of disability that was present was also treated.

Before giving the exercise intervention, the mean NDI % was observed to be 23.5%. After the exercise intervention, the mean NDI % reduced to 19.5%.

The mean age of the 40 participants was observed to be 16.67 years.

Discussion

This study has been conducted by the inclusion of 40 student participants (both male and females) of age groups 14-19 years, having neck pain as one of their main concerns. The subjects were given static neck exercises for a period of 1 month, 2 sets, each with 10 repetitions for three days in a week. The results of the exercises have depicted significant changes in the scores of NPRS and NDI by the comparison of Pre-& Post- exercise results.

By undertaking Neck Disability Index questionnaire, we can see that neck pain is a major concern in both males and females equally. The mean age that is affected due to mechanical neck pain is 16.67

which is approximately students of 16 to 17 years of age. With the help of Numeric Pain Rating Scale, the mean of pain that was reported before the exercise intervention was 5.75. After receiving the static neck exercises, the mean of pain had reduced to 4.5. With the help of NDI questionnaire, we observed that the mean% of disability before the exercise intervention was 23.5%. After receiving the exercises, the mean% of disability reduced to 19.5%. By the application of Paired t-test tool we could observe a significance in the results of NDI and NPRS which was $p < .001$.

A study conducted by Sowmya, MPT-Ortho of physiotherapy college of Chennai, proved and stated that strengthening of neck by giving isometrics or dynamic neck exercises both are effective to treat neck pains especially in chronic conditions. In support to this, our study also proves that isometric or static neck exercises are equally effective in relieving neck pains due to mechanical causes.⁹

A study performed by park su jin stated the effectiveness of strengthening the deep flexor muscle group of neck for treating posture, endurance, strength. According to the study, flexor group muscles are important to maintain neck-shoulder joint complex for posture related concerns. Thus, our study not only focused on strengthening flexor muscle groups but also other muscles groups such as neck extensors, neck side flexors, neck rotators.⁽¹⁴⁾

According to Leili tapak and Iman, their study reported high prevalence of neck pain in elementary school students due to reasons such as incorrect sitting posture, assignment and study load, inappropriate furniture of school and the difficulty to view board in class. Thus, from our study we come to know that online classes have also affected school students leading to mechanical type of neck pains.¹

Therefore, according to our results and observations obtained, the null hypothesis that stated- exercises will have no effect or change on neck pain, can be rejected; as this intervention has proven significant changes in mechanical neck pain.

- *Limitations:*

1. The sample size was less.
2. There was no comparative group, therefore we could not compare and find if any

other intervention is better than static neck exercises.

- *Recommendations:*

1. The study duration can be increased to see other effects of static neck exercises such as range of motion, strength, posture correction.
2. These exercises protocols can be performed on a larger population.
3. Stretching type of exercise can be performed together in this study.
4. The static neck exercises can be performed using TheraBand's and beach volleyball.

Conclusion

Static neck exercises are effective means to increase muscle size of the neck by strengthening the muscles around the neck. It helps in improving functionality and ability of the muscle to perform neck movements in all directions smoothly. Hence making the muscle-joint complex more efficient.

Even if we want to give dynamic or advance resistance training for further rehabilitation of patients, strength is an important factor in all aspects. Isometrics or static exercises are safe, best, and effective way to begin by building strength and functionality in any muscle; at the same time taking care of the muscles and joints around to not be exerted or stressed.

Therefore, from this study we can conclude that providing static neck exercises on neck pain for school students who have attended online classes is effective to treat and relieve pains, discomfort, stiffness etc.

Ethical Clearance: Institutional Ethical committee of Amity University, Uttar Pradesh

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Conflict of Interest: Nil

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