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Effect of worksite physical therapy intervention on neck pain among office workers

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Abstract

Background and Objectives

It is common for office workers to sit on an office chair for prolonged periods without having the chance to walk or make any kind of movement with hands and/or legs that would activate large muscle groups. While sitting, office workers tend to lean forward or to slouch down in the chair. This partial immobilization can cause low-back pain or neck pain because static posture increases stress on the back, neck, shoulders, arms, and legs. In particular, sitting can add large amounts of pressure to the back muscles, spinal disks, and ligaments. With time, incorrect sitting posture can damage spinal structures and contribute to or worsen back and neck pain.

Work related musculoskeletal disorder (WMSD) is a wide range of inflammatory and degenerative disease and disorders that result in pain and functional impairment arising when an individual is exposed to work conditions. The cause of work related MSDs are usually multifactorial including physical, ergonomic, and psychological factor. WMSDs usually occurs in workers who have excessive repetition, awkward postures and heavy lifting

Methodology: 30 subjects were recruited and were divided into two groups namely experimental and control, comprising 15 participants each. The experimental group was receiving neck isometrics and stretching exercises for a period of 6 weeks and the control group was not receiving any interventions. Neck Disability Index and Visual Analog Scale was used to measure at the beginning and after sixth week.

Conclusion: Statistically it is observed that, the stretching and strengthening exercise leads to a significant improvement in strength and decrease neck pain of the subjects under study. Based on the performed study, it can be concluded that stretching and strengthening exercise therapy can be performed as a daily routine to improve strength and to decrease pain on neck.

Keywords: Neck disability index, visual analog scale, WSPT

Introduction

Methodology

Materials Used

- Goniometer (180 degree)
- Record book
- Data collection book
- Weighing machine

Study Setting

- Indo American Hospital, Chemmanakary, Vaikom, Kottayam, Kerala
- Indo American Hospital, West Gate, Vaikom, Kottayam, Kerala

Study Design

- Experimental study design

Sampling Method

- Random sampling method

Sample Size

- 30 subjects with neck pain selected from study setting

Study Duration

- January 2021 TO JULY 202

Outcome Measures**1. Neck Disability Index:**

The NDI is a modification of the Oswestry Low Back Pain Disability Index. It is a Patient completed, condition specific functional status questionnaire with 10 items including pain, personal care, lifting, reading, headache, concentration, work driving, sleeping and recreation. The test can be interpreted as a raw score, with a maximum score of 50 or as a percentage.

0 points or 0 % means: no activity limitations.

50 points or 100 % means: complete activity limitations.

A higher score indicates more patient rated disability.

2. Visual Analogue Scale (VAS)

The visual analogue scale is a psychometric response scale which can be used in questionnaires. It is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. It will be presented as 100 mm horizontal line on which patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable". Its simplicity, reliability and validity as well as its ratio scale properties make the VAS the optimal tool for describing pain severity or intensity.

Variables**Independent Variable**

- Strengthening and stretching.
- Therapeutic exercise
- Postural Education

Dependent Variable

- Pain.
- Disability

Selection Criteria**A. Inclusion Criteria**

1. Being employed in the current hospital for at least 12 months
2. Age below 50 years, females and males
3. Office workers having history of neck pain for greater than 3 months
4. Office workers with nonspecific neck pain that is; without any etiology like infection or inflammation
5. Subjects with minimum to moderate disability score ie; less than 30 %.

B. Exclusion criteria

1. Known case of disc prolapse, spinal canal stenosis
2. History of severe trauma
3. Pregnancy
4. History surgical treatment of neck
5. Subjects taking medical treatment for any other disease condition

Study Procedure

After getting permission from administration in both the study setting, office workers were asked if they are interested after explaining the procedure. The study population included 30 patients fulfilling both inclusion & exclusion criteria. They were divided into 2 groups in which Experimental Group A and Control Group B. Informed consent was obtained from each subject prior to participation from interested candidates. A brief description about the procedure was given to the

subjects before commencing the study. A total of 30 subject were divided equally into two groups by random sampling method, Group A [n=15] & Group B [n=15]. Group A continued with their normal exercise and they had undergone stretching and strengthening. Group B had not undergone any treatment but to stay physically active throughout.

Group A: Experimental Group

This group contains 15 subjects who was randomly allotted to participate in the WSPT program,

The worksite physical therapy program consist of,

a) Therapeutic Exercise

Neck Exercises: Chin tucking exercise, Shoulder shrugging exercise, Shoulder rolling exercise, Scapular retraction exercises.

b) Postural advice: The subjects were advised to correct their posture from the advise given by the therapist on regular basis.

Standing against a wall

- First step, subjects must come to a pelvis tilt position to eliminate the lumbar extension and hold this position for 10 seconds.
- Check point: The lumbar spine should be flat and touching the wall
- Second step, while maintaining pelvis tilt, subjects must bring their shoulders in contact with the wall and hold this position for 10 seconds.
- Check point: Shoulders should touch the wall and remain there.
- Third step, subjects must tuck their chin and finally lift their head while maintaining the chin tuck and the previous two positions.

Check point: They must lift their head like someone is tearing out their hair.

Note: Subjects always must remember to move air in and out of their lungs and maintain proper posture while executing the exercise protocol.

Standing Position

- Begin neck movements in all directions flexion, extension, left and right rotations, and side flexion, while continuously holding the scapulas on the thoracic cage, the wall will help keep the proper scapula position. Make slow and controlled movements trying to reach full pain-free range of motion. Imagine the head bisected and divided into upper and lower halves at the point of the upper lip. Place the index and middle fingers on the upper portion of the lip as a guide to move the head back into a retracted position.

Flexion: Tuck the chin while lifting the top of your head. Return to the neutral position.

Extension: Lift the chin until the posterior head still touches the wall

Free-standing position: Make shoulder rolls. While in proper standing position, with hands comfortably resting on the thighs, slowly move your shoulders in large circles, first in the forward direction and then backward. The range should be broad but comfortable enough not to worsen pain symptoms. Shoulder rolls help to engage the cervicothoracic muscles and prepare them for activity. The purpose is to improve the

contractility of these muscles and increase blood flow to the region. Therefore, the more repetitions subjects perform, the more benefits they get.

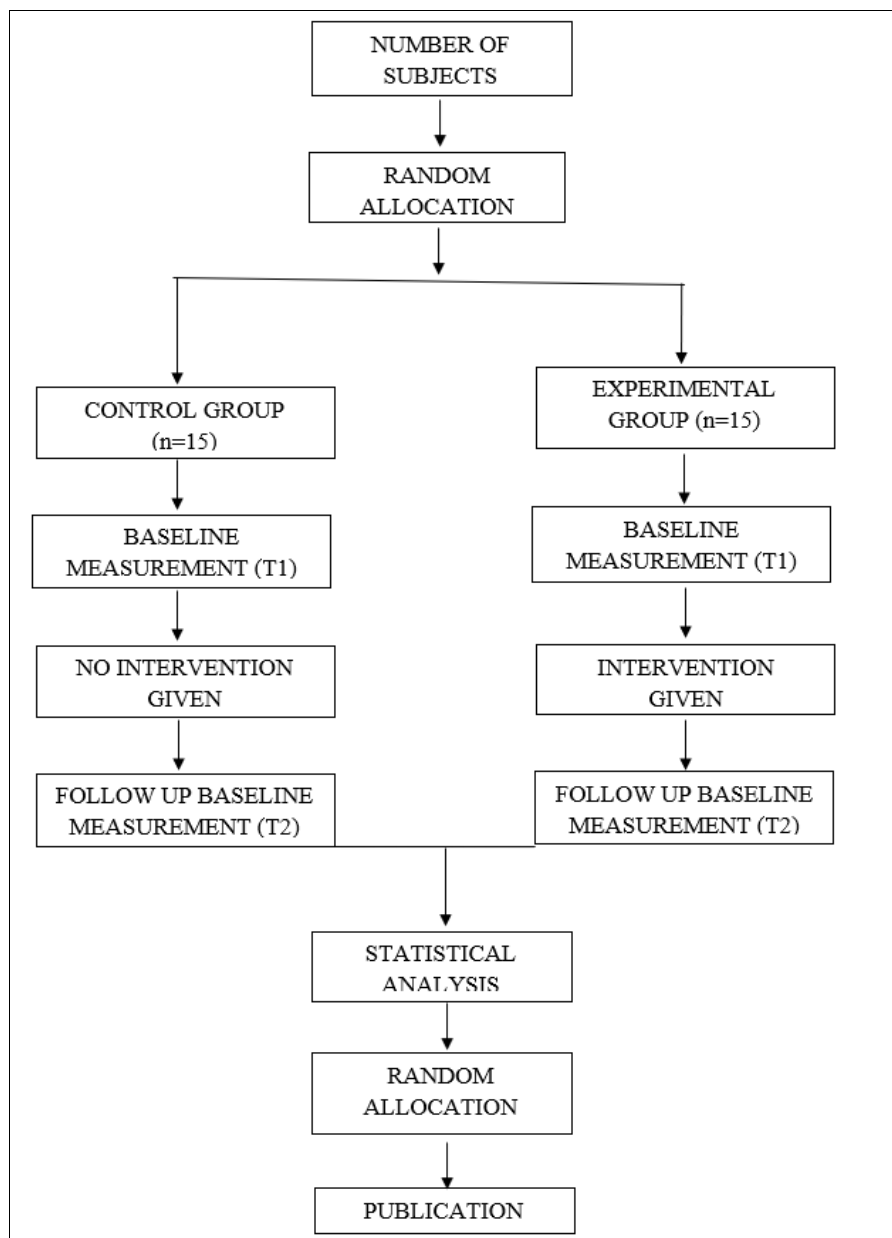
Note: Repeat this exercise at a pain-free range as many times as comfortable at the beginning and at the end of the exercise protocol.

Sitting Position Proposed to Be Maintained While Working

- Slowly roll the pelvis forward to create a normal lumbar lordosis.

- Lift the sternum, so the shoulders fall back into a neutral position.
 - Tuck the chin as if making a double chin and lift the head while maintaining the chin tuck. Relax to a resting comfortable position. This final position should always be maintained during static sitting activities as typing on the computer, talking on the phone, and so on.
- Exercise sessions 15minutesper session for 3 times / week, follow up by the Therapist once every week, Total duration of treatment 4 weeks.
- After 6 weeks treated subjects shall be evaluated for their score on outcome tools.

Flow chart describing the methodology (Figure no 7)



Statistical Analysis

Table 1: Statistical analysis of Neck disability index using t-tests Comparison of Pre-test Post-test Neck disability index in Experimental and Control Groups

Group	Pre-test mean	SD	Post-test mean	SD
Experimental	43.8	5.29	24.73	2.91
Control	41.33	4.99	37.86	5.20

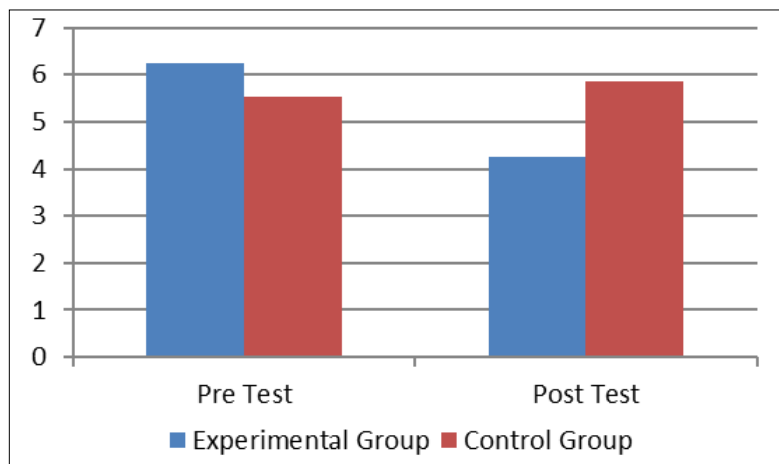


Fig 1: Comparison of Pre-test Post-test Neck disability index in Experimental and Control Groups

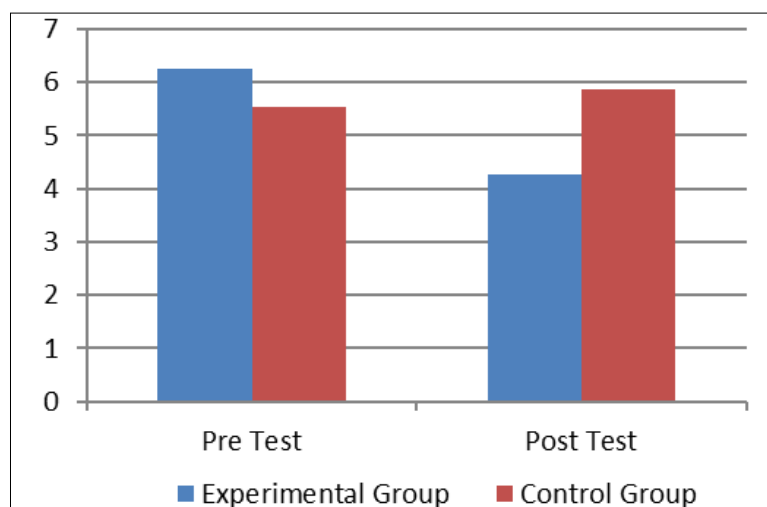


Fig 2: Comparison of Pre-test Post-test pain in Experimental and Control Groups

Table 2: Mean, S.D. and t-value to compare Pre-test & Post-test Neck Disability Index in Experimental Group

Test	Mean	SD	Mean change	n	t	df	Table value	P-value
Pre-test	43.8	5.29	24.73	15	25.54	14	2.14	$p < 0.05$
Post test	19.06	2.9						

Table 3: Mean, S.D. and t-value to compare Pre-test Post-test Neck Disability Index In Control Group

Test	Mean	SD	Mean change	n	t	df	Table value	p-value
Pre-test	41.33	4.99	3.46	15	6.10	14	2.14	$p < 0.05$
Post-test	37.86	5.20						

Table 4: Mean, S.D. and t-value to compare the pre-test Neck Disability Index scores between Experimental and Control Groups using t-test

Group	Pre-test Mean	S.D.	Difference in mean	n	t	df	Table Value	p-value
Experimental	43.8	5.29	2.46	30	1.31	28	2.04	$p = 0.20$
Control	41.3	4.99						

Table 5: Mean, S.D. and t-value to compare the post-test Neck Disability Index scores between Experimental and Control Groups using t-test

Group	Mean	S.D.	Difference in mean	n	t	df	Table value	p-value
Experimental	19.06	2.91	18.8	30	12.20	28	2.04	$p < 0.05$
Control	37.86	5.20						

Table 6: Statistical analysis of pain using t-tests Comparison of Pre-test Post-test pain in Experimental and Control Groups

	Pre-test mean	SD	Post-test mean	SD
Experimental	6.26	1.161	1.09	0.29
Control	5.53	1.06	5.86	0.83

Table 7: Mean, S.D. and t-value to compare Pre-test & Post-test pain in Experimental Group

Test	Mean	SD	Mean Change	n	t	df	Table value	p-value
Pre-test	6.26	1.16	2	15	14.49	14	2.14	$p < 0.05$
Post-test	4.26	1.09						

Table 8: Mean, S.D. and t-value to compare Pre-test & Post-test pain in Control Group

Test	Mean	SD	Mean change	n	t	df	Table value	p-value
Pre-test	5.53	1.06	0.33	15	1.58	14	2.14	$p > 0.05$
Post-test	5.86	0.83						

Table 9: Mean, S.D. and t-value to compare the pre-test pain scores between experimental and Control Groups using t-test

Group	Pre-test Mean	S.D.	Difference in mean	n	t	df	Table value	p-value
Experimental	6.26	1.16	0.73	30	1.80	28	2.04	$p = 0.08$
Control	5.53	1.06						

Table 10: Mean, S.D. and t-value to compare the post-test pain scores between experimental and Control Groups using t-test

Group	Mean	S.D.	Difference in mean	n	t	df	Table value	p-value
Experimental	4.26	1.09	1.6	30	4.48	28	2.04	$p < 0.05$
Control	5.86	0.83						

Result

Control Group

Evaluation of Neck Disability Index

By comparing the pre-test and post-test neck disability index scores in office workers in the control group, mean change 3.46 is the difference between pre-test and post-test (41.33&37.86). Since the *t-value*, 6.10 is greater than the table value 2.14, $p < 0.05$, there is a significant difference existing between the pre-test and post-test disability index scores among individuals in the control group.

Evaluation of Visual Analogue Scale.

By comparing the pre-test and post-test of VAS in office workers in the control group, mean change 0.33 is the difference between pre-test and post-test (5.53 & 5.86). Since the *t-value*, 1.58 is less than the table value 2.14, $p > 0.05$, there is no significant difference existing between the pre-test and post-test pain scores among individuals in the control group.

Experimental Group

Evaluation of Neck Disability Index

By comparing the pre-test and post-test neck disability scores in office workers in the experimental group, mean change is the 24.73 is the difference between pre-test and post-test (43.8 & 19.06). Since the *t-value*, 25.54 is greater than the *table value* 2.14, $p < 0.05$, there is a significant difference existing between the pre-test and post-test disability index scores among individuals in the experimental group.

Evaluation of Numeric Pain Rating Scale

By comparing the pre-test and post-test VAS scores of in office workers in the experimental group, Mean change 2 is the difference between pre-test and post-test (6.26 & 4.26). Since the *t-value*, 14.49 is greater than the table value 2.14, $p < 0.05$, there is a significant difference existing between the pre-test and post-test pain scores among individuals in the experimental group. The pain has significantly reduced in the post test. This proves the effect of therapeutic exercise program on pain.

Limitation

Due to the lack of male participants in my study, the generalization of the findings of this study with that of male patients having neck pain was not possible. Also side of the pain was not considered here and unable to cover all factors that could affect the MSDs such as working seniority, break time during working, division by particularly for each department those with high working intensity, and poor working postures (Surgery, anesthesia, emergency

department).

Due to COVID 19 situations it was difficult to approach the subjects and few sessions were conducted through online.

Time was another factor which limited the study because office workers would be on hectic schedule and it is difficult to get time in between

Future Research

The sample size of the study can be increased; hence it may lead to better results.

The treatment duration of the study can be increased.

Can be administered in school students and other educational field A follow-up study could ensure the long-term effect of the treatment programme.

Conclusion

Statistically it is observed that, the stretching and strengthening exercise leads to a significant improvement in strength and decrease neck pain of the subjects under study. Based on the performed study, it can be concluded that stretching and strengthening exercise therapy can be performed as a daily routine to improve strength and to decrease pain on neck.

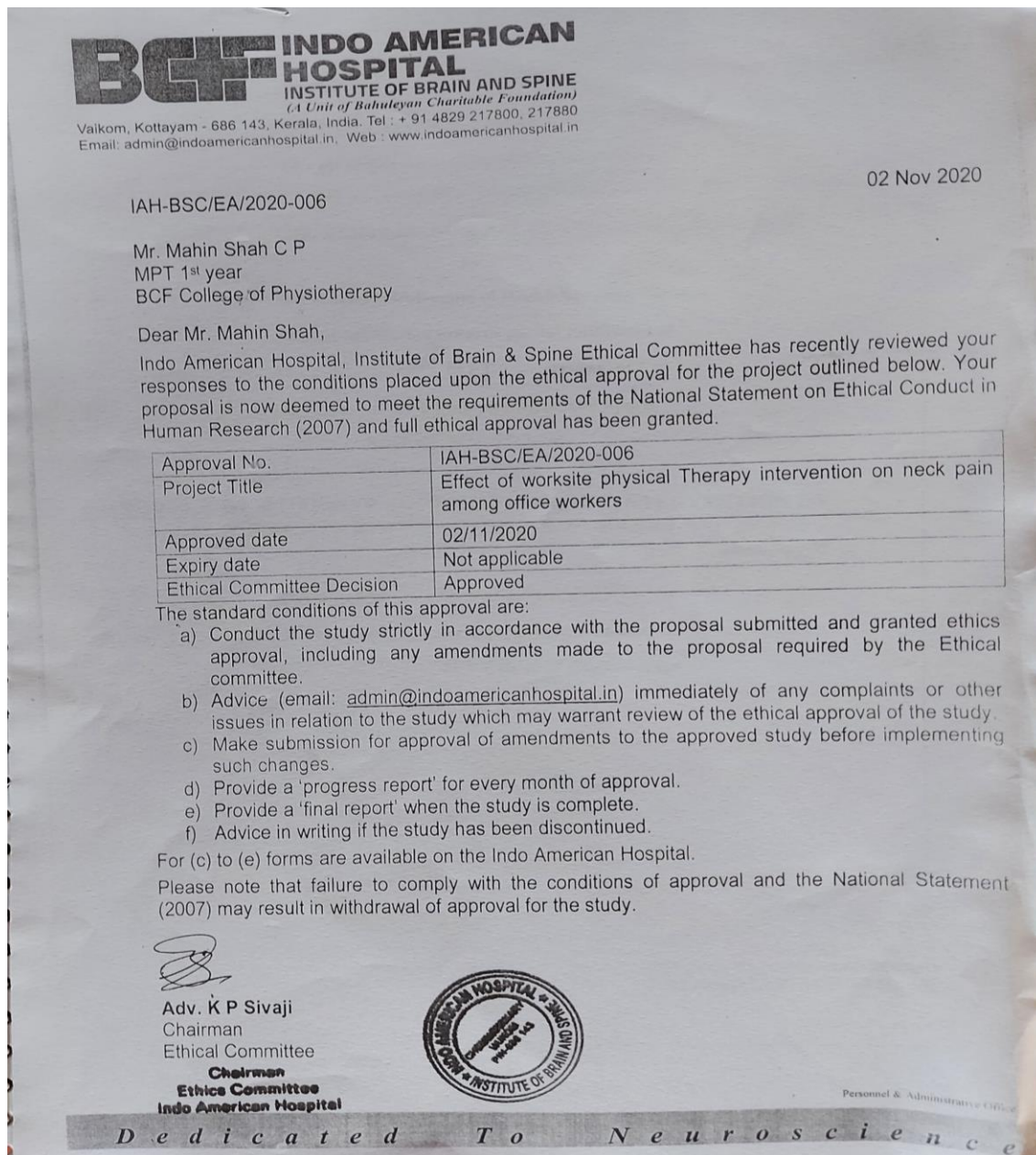
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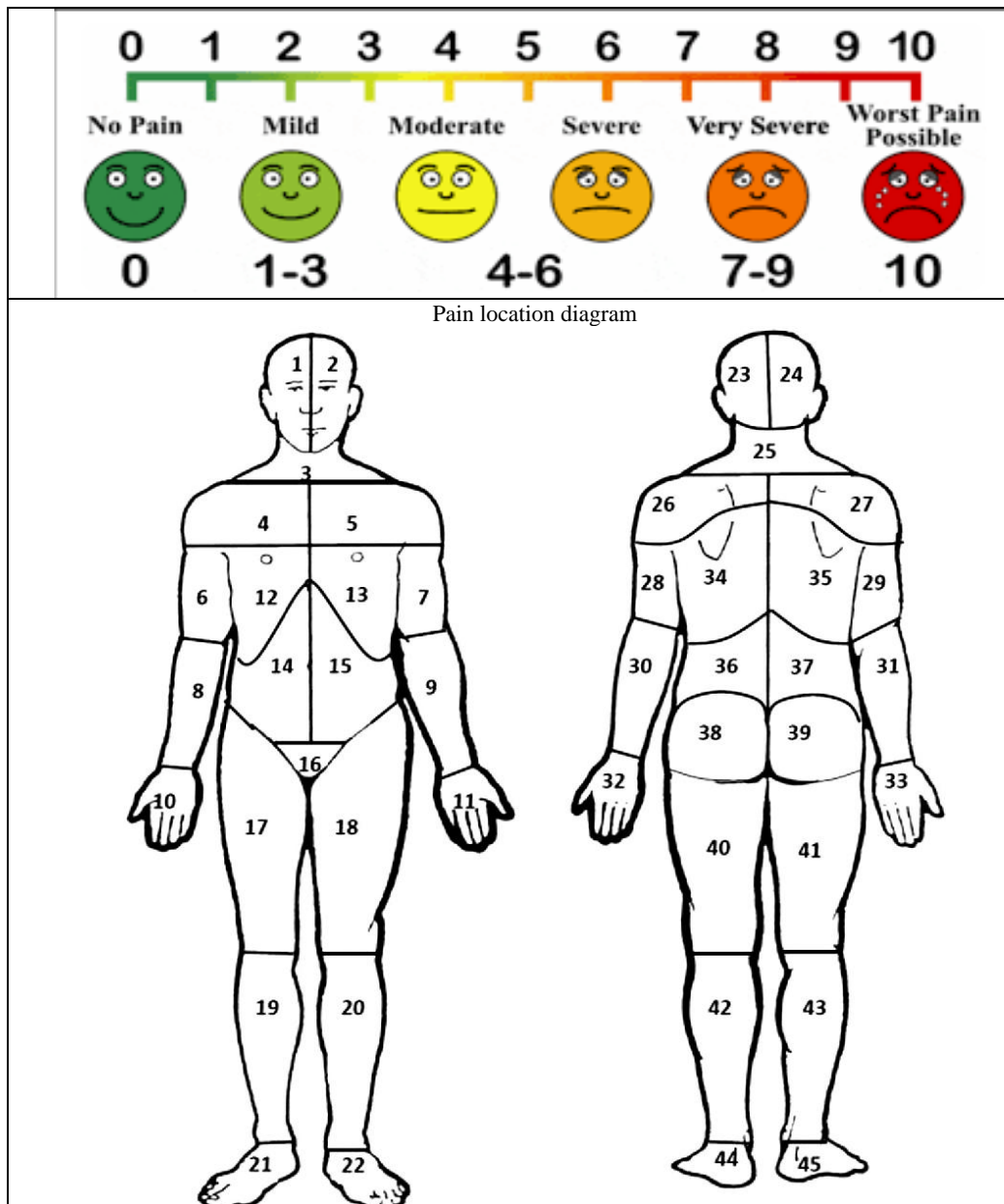
10. Annexures

10.1 Ethical clearance certificate



10.2 Performa for comprehensive assessment of the research Subjects

Date of assessment	Name: Age: Gender:	Date of Birth
Pain assessment	Relieving factor	Aggravating factor
	VAS score	



Intervention

Warm up exercise of neck, isometric exercise to neck muscles, stretching exercise to cervical flexors, trapezius and sternocleidomastoid and shoulder shrugs, shoulder rolling, scapular retraction and postural correction.

Name of therapist:

Signed:

Date:

Data of outcome measures

Table 11: Pre-test and Post-test values of NDI SCALE of both experimental group and control group.

SL. No	Group A		Group B	
	Pre-Test	Post-Test	Pre-Test	Post-Test
1	38%	32%	46%	20%
2	40%	34%	48%	22%
3	44%	44%	36%	18%
4	34%	32%	42%	20%
5	44%	40%	50%	24%
6	38%	34%	40%	18%
7	34%	34%	42%	18%
8	48%	46%	36%	16%
9	46%	40%	42%	16%
10	50%	48%	48%	16%
11	38%	36%	38%	14%

12	38%	36%	54%	24%
13	46%	40%	44%	20%
14	44%	40%	42%	20%
15	38%	32%	49%	20%

Table 12: Pre-test and Post-test values of VAS of both control group and experimental group

SL. No	Group A		Group B	
	Pre-Test	Post-Test	Pre-Test	Post-Test
1	6	7	7	5
2	6	6	6	4
3	6	6	4	3
4	7	6	4	2
5	7	8	7	5
6	5	6	5	3
7	4	5	7	5
8	5	6	7	6
9	6	6	8	6
10	4	5	7	4
11	4	5	6	4
12	7	6	7	4
13	5	6	6	4
14	6	5	7	5
15	5	5	6	4

Scales Used**Neck Disability Index****Instructions**

This questionnaire has been designed to give your health practitioner information as to how your neck pain has affected your ability to manage in everyday life. Please answer every section and mark in each section only the ONE box which applies to you. We realise you may consider that two of the statements in any one section relate to you, but please just mark the box which most closely describes your problem.

Section 1: Pain intensity

- I have no pain at the moment.
- The pain is very mild at the moment.
- The pain is moderate at the moment.
- The pain is fairly severe at the moment.
- The pain is very severe at the moment.
- The pain is the worst imaginable at the moment.

Section 2: Personal care (washing, dressing)

- I can look after myself normally without causing extra pain.
- I can look after myself normally but it causes extra pain.
- It is painful to look after myself and I am slow and careful.
- I need some help but manage most of my personal care.
- I need help every day in most aspects of self-care.
- I do not get dressed, I wash with difficulty and stay in bed.

Section 3: Lifting

- I can lift heavy weights without extra pain.
- I can lift heavy weights but it gives extra pain.
- Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, for example on a table.
- Pain prevents me from lifting heavy weights, but I can manage light to medium weights if they are conveniently positioned.
- I can lift very light weights.
- I cannot lift or carry anything at all.

Section 4: Reading

- I can read as much as I want to with no pain in my neck.
- I can read as much as I want to with slight pain in my neck.
- I can read as much as I want with moderate pain in my neck.
- I cannot read as much as I want because of moderate pain in my neck.
- I can hardly read at all because of severe pain in my neck.
- I cannot read at all.

Section 5: Headaches

- I have no headaches at all.
- I have slight headaches which come infrequently.
- I have moderate headaches which come infrequently.
- I have moderate headaches which come frequently.
- I have severe headaches which come frequently.
- I have headaches almost all the time.

Section 6: Concentration

1. I can concentrate fully when I want to with no difficulty.
2. I can concentrate fully when I want to with slight difficulty.
3. I have a fair degree of difficulty in concentrating when I want to.
4. I have a lot of difficulty in concentrating when I want to.
5. I have a great deal of difficulty in concentrating when I want to.
6. I cannot concentrate at all.

Section 7: Work

- I can do as much work as I want to.
- I can only do my usual work, but no more.
- I can do most of my usual work, but no more.
- I cannot do my usual work.
- I can hardly do any work at all.
- I cannot do any work at all.

Section 8: Driving

- I can drive my car without any neck pain.
- I can drive my car as long as I want with slight pain in my neck.
- I can drive my car as long as I want with moderate pain in my neck.
- I cannot drive my car as long as I want because of moderate pain in my neck.
- I can hardly drive at all because of severe pain in my neck.
- I cannot drive my car at all.

Section 9: Sleeping

- I have no trouble sleeping.
- My sleep is slightly disturbed (less than 1 hr sleepless).
- My sleep is mildly disturbed (1-2 hrs sleepless).
- My sleep is moderately disturbed (2-3 hrs sleepless).
- My sleep is greatly disturbed (3-5 hrs sleepless).
- My sleep is completely disturbed (5-7 hrs sleepless).

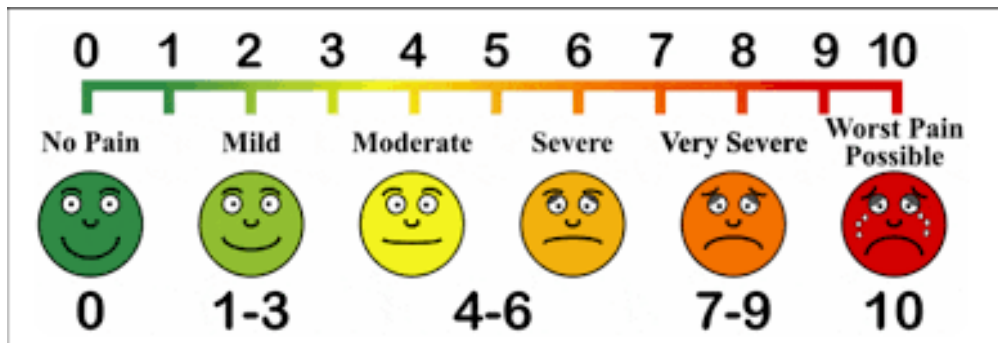
Section 10: Recreation

- I am able to engage in all my recreation activities with no neck pain at all.
- I am able to engage in all my recreation activities, with some pain in my neck.
- I am able to engage in most, but not all of my usual recreation activities because of pain in my neck.
- I am able to engage in a few of my usual recreation activities because of pain in my neck.
- I can hardly do any recreation activities because of pain in my neck.
- I cannot do any recreation activities at all

Visual Analogue Scale

Visual Analogue Scale (VAS): The visual analogue scale is a psychometric response scale which can be used in questionnaires. It is a measurement instrument for subjective characteristics or attitudes that cannot be directly measured. It will be presented as 100 mm horizontal line on which patient's pain intensity is represented by a point between the extremes of "no pain at all" and "worst pain imaginable". Its simplicity, reliability and validity as well as its ratio scale properties make the VAS the optimal tool for describing pain severity or intensity.

The 11-point numeric scale ranges from '0' representing one pain extreme (e.g. "no pain") to '10' representing the other pain extreme (e.g. "pain as bad as you can imagine" or "worst pain imaginable").



10.5. Consent form-English

Title of the study: Effect of worksite physical therapy intervention on neck pain among office workers

Statement of the Participant

I have been explained in detail about the procedures to be carried out in this study. I have been given opportunity to discuss and ask questions with the responsible physiotherapist regarding the same. I have understood that no harm would cause to my health by participating in the study. I agree to participate voluntarily in the study.

Name of patient: Signature:

Name of therapist: Signature: