Original Article

Effectiveness of A New Visual Distraction Technique in Decreasing Kinesiophobia with Chronic Neck Pain

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How to cite this article: Poorva Devi , Diptee Bhole , Effectiveness of A New Visual Distraction Technique in Decreasing Kinesiophobia with Chronic Neck Pain. Indian Journal of Physiotherapy & Occupational Therapy / Vol. 19 No. 1, January-March 2025

Abstract

Background: Kinesiophobia or fear of movement is a cause of decreased level of activity in patients with chronic neck pain. Traditional forms of treatment, such as physiotherapy alone, can tackle problems of neck pain, but not kinesiophobia. This study aims to study the effect of visual distractiontechnique in the treatment of kinesiophobia.

Study design: Quasi experimental study.

Methods: A total of 43 participants with chronic neck pain and kinesiophobia were selected for the study. These participants underwent assessments on the NRS, Tampa scale and evaluation of cervical ROM. Assessment was done pre and post intervention of two weeks.

Results: A significant reduction in Tampa score and NRS scores was observed and improvement in cervical ROM were seen post intervention in all subjects.

Conclusion: The new visual distraction tool is effective in reducing kinesiophobia levels and NRS scores and improving cervical ROM in patients with chronic neck pain with kinesiophobia.

Keywords: chronic neck pain, kinesiophobia, cervical ROM, visual distraction

Introduction

Neck pain or cervicalgia is a common problem in about two-thirds of the population in the world [(1)]. The overall prevalence of neck pain in the general population ranges between 0.4% and 86.8% (mean=23.1%) [(2)]. The onset and course of neck pain is influenced by several personal and environmental factors such as muscle tension, tight structures, poor posture or conditions in which pressure is exerted on nerve roots and blood vessels [(3)]. Neck pain may be minor, short lived and easily ignored, it may come and go, or it may be constant and excruciating to a point that it interferes with daily activities. Its onset can be sudden due to an injury, or it may develop gradually over a period as a result of poor posture or wear and tear [(4)]. Depending on the duration, pain is categorized as acute, sub-acute and chronic. Acute pain arises due to injury or trauma to the tissue and is often short lived. Any pain lasting for more than 6 months is categorized as chronic neck pain. According to Fejer and Hartvigsen, chronic neck pain is a neuromusculoskeletal condition frequently associated with

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Submission: Jan 17, 2024 **Revision:** Oct 17, 2024 **Published date**: 12/12/2024

disturbances in the psychological state including anxiety, depression, kinesiophobia, catastrophizing which play an influential role in shaping pain responses [5]. Patients with chronic neck pain are reported with higher pain intensity and fear of movement. Avoidance of neck movement due to fear of pain is called kinesiophobia. Miller, Koli and Todd (1990) have described kinesiophobia as a situation where "a patient has an excessive, irrational, and debilitating fear of physical movement and activity resulting from a feeling of vulnerability to painful injury or reinjury" [6]. While the terms pain related fear/fear of movement and kinesiophobia are often used synonymously. Kinesiophobia is a stronger concept and more phobic in nature, it is a non-proportionate fear that cannot be explained, and with a reaction to it that is out of volitional control [7]. In patients with chronic neck pain, kinesiophobia may lead to avoidance behavior resulting in hyper vigilance to bodily sensations, followed by disability, disuse and depression [8]. It can be speculated that high kinesiophobia degrees cause low physical activity levels. The gold standard instrument to measure kinesiophobia is the Tampa scale.Kinesiophobia and especially depression appear to be psychological states with a connection to the physical activity level of patients with chronic neck pain. According to the fear avoidance model, daily activities and functional capacity may be reduced to avoid pain in such cases. An untreated pain may lead to a negative spiral resulting in increased fear of movement, avoidance behavior and ultimately disuse, depression and further exacerbation of pain, thus making treatment important.[9,10] Traditional forms of treatment to treat chronic neck painmay not always address the problem of kinesiophobia. Some existing treatment methods for kinesiophobia are cognitive behavior therapy and attention diversion strategies such as mental imagery and virtual reality. However, they are expensive and require skilled personnel thus making them difficult toimplement in all settings. As visual distraction is proven to be effective for treatment of kinesiophobia, the current study was taken up to introduce a simple and inexpensive tool which works on the principle of visual distraction.

Materials and Methods

Study Design:A One group pretest- post-test (Quasi Experimental) design was implemented for the study.

Aim

To study the effectiveness of a new visual distraction technique in decreasing kinesiophobia associated with chronic neck pain.

Objectives

a. To assess pre intervention level of kinesiophobia (primary outcome measure), pain and cervical range of motion (ROM) (secondary outcome measure).
b. To assess post intervention level of kinesiophobia, pain and cervical ROM
c. To compare the effect of new visual distraction technique on levels of kinesiophobia, pain and cervical ROM pre and post intervention.

Hypothesis

Null hypothesis

There is no difference in the levels of kinesiophobia, pain and cervical ROM with the new visual distraction technique in subjects with kinesiophobia associated with chronic neck pain.

Experimental hypothesis

There is a difference in levels of kinesiophobia, pain and cervical ROM with the new visual distraction technique in subjects with kinesiophobia associated with chronic neck pain.

Participants

With an α =0.05, ß=0.2; $Z\alpha$ =1.96, Z1-ß =0.8416, σ =standard deviation of 1, estimated Δ = 0.6 ; the sample size was calculated to be 43.

Out of the patientswith chronic neck pain that were screened using the Tampa scale, 43 individuals who showed presence of kinesiophobia, and the rest were excluded from the study. The study spanned over a period of two weeks.

Inclusion criteria:

a. Patients suffering from neck pain with a duration of more than 6 months.
b. Presence of kinesiophobia as assessed on Tampa scale.
c. All genders and age groups between 18-60 years.
d. Previous history of physiotherapy intervention.

Exclusion criteria:

a. History of previous trauma/surgery of cervical spine, thoracic spine and/or upper extremity.
b. History of neurological and systemic musculoskeletal conditions.
c. Vertebrobasilar insufficiency.
d. Subjects with visual acuity deficits with corrective glasses.

Materials

The following materials were used for this study.

a. Universal goniometer: Full 360 degrees calibrated goniometer with a validity and reliability of 0.96 and 0.97 respectively.
b. Headband: The headband was fabricated from a nylon material and had adjustable Velcro straps to

accommodate the subject's head circumference. A loop was present at the top to mount the laser.

c. Laser: A commercially available and battery-operated laser was used which was mounted at the top of the headband.
d. Cardboard cutouts: Red wall mounts made up of chart paper were mounted on the wall, placed equidistant at one meter respectively for visual cues.
e. Tampa scale: The 17-item Tampa scale was used for the assessment of kinesiophobia. It has a reliability of 0.82 and validity of 0.70. The scale uses a 4-point Likert scale (Strongly Disagree-Disagree-Agree-Strongly Agree)Individual item scores range from 1-4, with the negatively worded items (4,8,12,16) having a reverse scoring (4-1).Scores above 37 (17-item) indicate kinesiophobia[11].
f. Numerical rating scale: It is a 11-point scale used for pain assessment with a reliability of 0.91 and validity of 0.95.

Procedure:

The study was presented and approved by the Institutional ethics committee. The participants of the study were provided with an information sheet stating the procedure/ risks / benefits of the study and were included only upon the receival of a written consent.

This was a quasi-experimental study. Participants satisfying the inclusion criteria were recruited from physiotherapy OPDs. The duration of the study was two weeks, and it was conducted in the physiotherapy OPD. All patients underwent a pre-intervention evaluation consisting of measurement of kinesiophobia on the Tampa scale, cervical ROM and Pain assessment. The 17 item Tampa scale had to be graded from 1-4 where 1=strongly disagree, 2= disagree, 3= agree, 4= strongly agree. It was a self-completed questionnaire with the scores ranging from 17-68 and higher scores indicating an increased degree of kinesiophobia. All cervical Range of Motions (ROM) including cervical flexion, extension, lateral flexion and rotation were assessed with a universal goniometer using standardized placements [11]. A Numerical Rating Scale (NRS) was used to assess pain. Patients thus selected underwent the followingintervention over a period of two weeks and the outcome measures were re assessed.

Positioning: The patients were treated in an OPD free from auditory and visual distraction. A red square was used as a reference point and mounted on the wall with 4 circular cut outs placed at 1 meter each in horizontal and vertical direction from this reference point. Facing the wall, the patient was seated on a stool 90 cm away from the wall and was made to wear a headband with a laser beam. The reference point was at the eye level of the patient, and neutral position the head and neck of the patient was ensured using a goniometer. (Figure1 & 2)

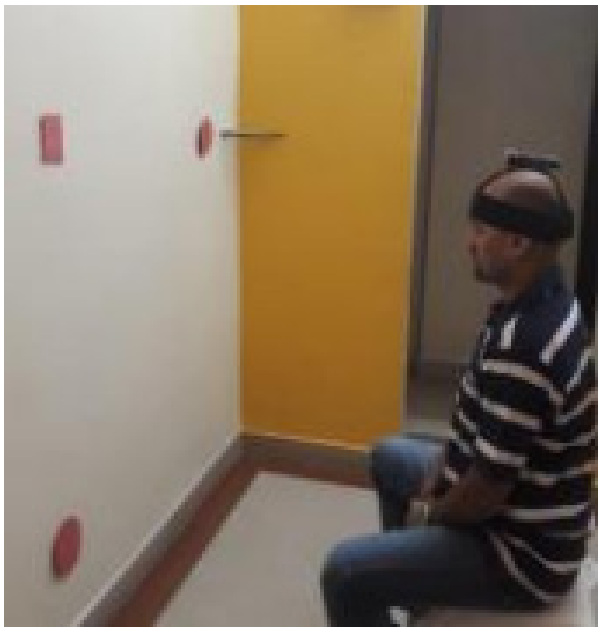

Figure1

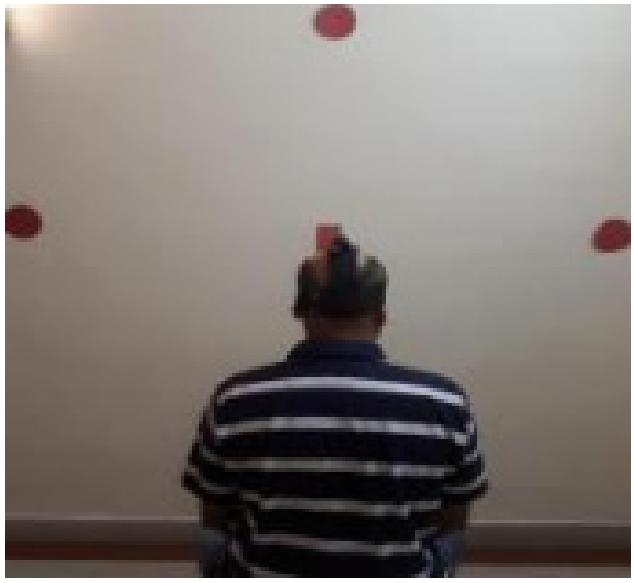

Figure2

Intervention: The patients were instructed to move the laser beam as far as possible in upward, downwards, left and right directions from the reference point, beyond targets marked for visual incentive. They were asked to perform ten repetitions on each side while the trunk was stabilized by the therapist. Sessions were repeated every day for a period of two weeks. No additional exercises were advised for the said intervention period and patients were asked to

report in case of any pain or discomfort in the neck during this programme. In any such case the intervention was discontinued, and traditional physiotherapy interventions were continued.

At the end of two weeks, Tampa scale, NRS and cervical ROM were reassessed, and analysis of data was performed.

Results and Discussion

Table 1: Non-parametric Data analysis with Wilcoxon signed rank test for Kinesiophobia and Pain:

	Kinesiophobia	Pain
	Tampa score (post_TMPA - pre_TMPA)	NRS
Mean Rank	22.00	22.00
Sum of Ranks	946.00	946.00
Negative Ranks	43	43
Positive Ranks	0	0
Ties	43	43
Z Score	-5.755	-5.747
P value (Asymp. Sig. (2-tailed)	0.000	0.000

Table 2: Data analysis for parametric data (cervical range of motion) using the paired t test

	pre_FLEXION - post_FLEXIO N	pre_EXTENSION - post_EXTENSIO N	*pre_rtrot - post_rtro t	*pre_ltrot - post_ltro t	*pre_rtSF - post_rtS F	*pre_ltSF - post_ltS F
Mean	-11.977	-27.209	-23.256	-23.488	-14.302	-14.419
SD	4.517	5.036	6.626	5.930	3.004	3.653
Std. Error Mean	.689	.768	1.011	.904	.458	.557
95% CI Lower	-13.367	-28.759	-25.295	-25.313	- 15.227	-15.543
95% CI Upper	-10.587	-25.659	-21.217	-21.663	- 13.378	-13.294
T score	-17.387	-35.431	-23.014	-25.975	- 31.218	-25.883
df	42	42	42	42	42	42
Sig. (2- tailed)	.000	.000	.000	.000	.000	.000

Abbreviations used in table *: rtrot: Right Rotation; ltrot: Left Rotation; rtSF: Right Side flexion; ltSF: Left side flexion

Discussion: In the current study, a new visual distraction technique was evaluated for its effectiveness in decreasing kinesiophobia in patients with chronic neck pain. Its effect on pain and cervical ROM in these subjects was also studied. To the best of our knowledge, this was the first study that used the laser pointer (used traditionally for the assessment of Joint repositioning error) as a simple, inexpensive visual distraction technique.

The following may be reasons for the changes obtained in the outcome measures:

Kinesiophobia:

From the data collected, comparisons were drawn between the pre and post intervention levels of the above parameters after a two-week intervention programme. There was a reduction in the post intervention Tampa scores of all 43 subjects as indicated by the negative ranks in table 1, with a p value <0.001.

The findings of the study indicate that the visual distraction technique has been effective in reducing kinesiophobia associated with chronic neck pain.It is proposed that the laser pointer and the setup, along with the instructions to carry the beam as far as is possible in the vertical and horizontal directions may have served as a diversion from the primary pain focus. Sullivan et al., (1998) suggested that interventions that assist patients in avoiding excessive focus on their pain sensations may be a viable means of reducing fear and catastrophizing, thereby facilitating the rehabilitation process. Attention diversion is one such strategy [12]. Distraction techniqueslike imagery modify a patient's perception of pain sensations, divert their attention away from it and allow them to focus the patient's attention on physical surroundings, thoughts or a scientific and detached observation of pain sensations. A patient experiencing pain could engage in mental activity or any other distracting activity [13]. Another explanation for the effectiveness of the technique may be provided by using the single channel theory (bottleneck) that suggests that parallel processing can be impossible for certain mental operations. When two tasks, physical and mental, require the same mechanism at the same time, there is a "bottleneck", and the performance of one or both tasks can be affected. Not forgetting the capacity sharing theory, which assumes that the processing capabilities or mental resources are divided between the tasks, meaning that there is limited capacity for processing information. [14] Based on the above-mentioned theories, it might be suggested that kinesiophobia subjects could have a reduction in Tampa values due to focusing on the new visual distractor and defocusing on fear. Thus, the instructions and visual incentive provided to move the neck as far as possible, beyond the markers, may have provided one such means to achieve the above and may have worked as a "Stealth exercise". Stealth exercises are a form of exercise wherein the patient is diverted away from the area of interest and towards some other engaging form of activity. Here the subjects were diverted from the area of pain/fear to a different and challenging background.

Pain:

The study showed that there was a decrease in the post intervention NRS scores in the subjects with a p<0.001.The decrease in the NRS levels can be attributed to the visual distraction techniques which caused a reduction in the pain and took the fear of movement away from the patients. The visual distraction technique using the laser beam may have worked by shifting the focus of the subjects from mind-crippling fear of pain to more goal orientation. Engaging in thoughts or activities that distract attention from pain is one of the most used and highly endorsed strategies for controlling pain. The process of distraction appears to involve competition for attention between a highly salient sensation (pain) and consciously directed focus on some other information processing activity. [15]

Cervical ROM:

The study showed an increase in the ROM of all movements at the neck. The cervical mobility was found to be reduced, to variable degrees, in all the subjects that participated in the study. This was partly attributed to the chronicity of the neck pain and partly, to the kinesiophobia associated with the pain. The improvements in the Cervical ROM in all directions can be attributed to the significant reduction the technique brought about in the levels of kinesiophobia and pain and not due to the movements attempted by the patients in those directions. It may be argued that the improved ROM may be, in part, because the patients performed movements in those directions while they attempted to move the laser beam farther away as possible. But the intervention in the present study was carried out for only 2 weeks while most studies evaluating the effectiveness of a mobility program propose the need of a duration of at least 4 weeks (1 month) [16]. Also, the patients were not instructed to perform any mobility exercises as a part of their home program.The movement for side flexion wasn't a part of the intervention program guided by the visual distraction tool, but nevertheless, showed a significant improvement post the intervention. This suggests that the improvement in cervical ROM occurred due to a decrease in Kinesiophobia and pain.

Conclusion

The current study proves the effectiveness of a new visual distraction technique in decreasing kinesiophobia as well as pain and improving range of motion associated with chronic neck pain. The less expensive visual distraction technique can be used as an adjunct with the conventional physical rehabilitation techniques in patients with kinesiophobia associated with painful musculoskeletal conditions in an OPD setting.

Source of funding: No financial support was obtained for the study and was self-funded.

Conflict of interest: The authors declare No conflict of interest.

Ethical Clearance: Was obtained from the Ethics committee of D.E. Society's Brijlal Jindal College of Physiotherapy, Pune DESBJCPPECR-3/ 15-03-2016

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