

# Effectiveness of Isometric Neck Exercises, Stretching and Ergonomics Over Ergonomic Alone For Neck Pain in Physiotherapists

Akshay Bansode<sup>1</sup> & Deepali Hande<sup>2</sup>

<sup>1</sup>BPT Intern, <sup>2</sup>Associate Professor,

<sup>2</sup>Department of Community Physiotherapy, Dr. APJ Abdul Kalam College of Physiotherapy, PIMS, Loni, Maharashtra, India, 413736.

---

## **Abstract:**

**Background:** Physiotherapy practice can lead to work related musculoskeletal disorders (WMSDs) in physiotherapists. We know little about the range of the problems, their severity, or the implications for affected therapists. Existing studies have focused on back pain but that underestimate the range of problems that may develop. There is increasing evidence that unique working conditions of physiotherapists can significantly affect their health. Various studies have demonstrated high prevalence of musculoskeletal pain and discomfort among physiotherapists. The activity of these professionals are related to the development of pain.

**Method:** In this experimental study design, 30 physiotherapists with neck pain randomly divided in 2 groups. One group received stretching, Isometric exercises and ergonomics and the other group received ergonomic alone for 4weeks. Outcome measurements such as pain intensity were calculate by using NRS(Numerical Rating Scale) and NDI(Neck disability Index).The scales were given to the participants to evaluate the pain before and after 4weeks of intervention.

**Result:** There is statistical improvement in means of pain and severity of signs and symptoms after 4week of intervention. But the group who received Stretching, isometric and ergonomics has got more relief than the group with ergonomic alone. Hence result shows that stretching, Isometric neck exercises and ergonomics are more effective than ergonomic alone for neck pain in physiotherapists.

**Conclusion:** The present study concluded that there is significant effect of stretching, Isometric neck exercises and ergonomics in Work Related neck pain in physiotherapists with Improvising the performance and quality of life too.

**KEYWORDS:** Neck pain, Numerical rating scale, Neck Disability Index, Ergonomics, Work related musculoskeletal disorders in physiotherapists, stretching exercise, Isometric exercise.

## **INTRODUCTION:**

A work-related musculoskeletal disorders (WMSDs) is defined as a musculoskeletal injuries that results from a work related event. This may result in loss of work time, work restriction, or transfer to another job.<sup>1</sup>

There is increasing evidence that unique working conditions of physiotherapists can significantly affect their health. Various studies have demonstrated high prevalence of musculoskeletal pain and discomfort among physiotherapists. The activity of these professionals are related to the development of pain. About 60% of musculoskeletal problems in physiotherapists occur as a consequence of work related injuries. Many physiotherapists report the onset of pain during their undergraduate course. Musculoskeletal disorders occur as a result of poor working posture and patient handling during clinical training.<sup>2</sup>

Neck disorders remain a common problem in physiotherapists. These problems, if ignored can prove debilitating and can cause crippling injury forcing one to change one's profession. Neck pain is assumed to be a multifactorial disease and it has been suggested that there are several risk factors contributing to its development. The contributing factors of neck symptoms are - Physical workloads, poor ergonomic work design and certain psychosocial factors. It is not possible that any individual has not suffered from neck pain. This pain can be trivial in nature and can lead to complications. Neck pain usually arises due to diseases of cervical spine and soft tissues of the neck. Muscular pain can be due to spasm of muscles caused by injury. If this spasm is for a long period, it becomes chronic pain.<sup>4</sup>

Neck pain should be identified and treated by posture correction and exercises to avoid complications, maintaining one position for prolong period of time or transferring a patient in awkward positions should be avoided. A flexed spine results in higher activity in cervical erector spinae, trapezius and thoracic erector spinae

muscles. There is evidence linking prolonged trunk flexed posture with increased muscle loading and a subsequently increased risk for symptoms in the upper body.<sup>6</sup>

At present time, musculoskeletal disorders are one of the most important problems ergonomists have encountered in the work place around the world. In many countries prevention of work-related musculoskeletal disorders has been considered as a national priority. WRMSD is a worldwide concern and distributed among both industrialized countries and industrially developing countries.

Studies showed that among physiotherapy professionals, 20 % of musculoskeletal problems is neck pain. A positive relation has been found between various neck disorders and work related risk factors, such as, static neck and arm postures, duration of sitting as well as workplace design. To avoid WMD in physiotherapists ergonomics are also important with exercises. So physiotherapists must follow the ergonomics while doing patients.

Ergonomic advice in physiotherapists may include to avoid repetitive movements as it may lead to fatigue, avoid to maintain one position for prolong period of time, proper care should be taken while transferring a patients, proper position should be maintained while applying modalities. Proper workstation may include lumbar, Thoracic or arm support on therapists chair, Position of treatment table, Edges of work surfaces should be comfortable, Proper ventilation.

## MATERIALS AND METHOD:

The Ethical clearance was obtained for the study from Institutional Ethical Committee of Dr. A.P.J. Abdul Kalam COPT Loni (PIMS/CPT/IEC/2016/16274). The participants were screened, and after finding their suitability according to the inclusion and exclusion criteria: The participants selected were physiotherapists with work related neck pain. The participants were briefed about the nature of study, the duration of intervention. They were encouraged to clarify queries regarding the study, if any. An informed written consent form, previously approved by the Institutional Ethical Committee was then obtained from the participants. The demographic data including name, age, Gender was obtained and a detailed assessment was done. The study variables were pain intensity, NRS and NDS.

**Pain intensity** pre and post intervention for all participants was assessed by NRS and NDS.

The numerical rating scale is unidimensional measure of pain intensity. It is a numerical version of VAS. The 11 points on the numeric scale ranges from "0" representing no pain and "10" representing the pain as bad as you can imagine. Ask the patient to select one number according to

the intensity of their pain. The scale has shown to have adequate reliability and responsiveness in patients with neck pain.

It has high test-retest reliability with ICC - 0.91

The Neck Disability Index is an instrument to assess neck pain complaints. It was developed from the Oswestry index for back pain and the Pain Disability Index. The authors are from the Canadian Memorial Chiropractic College in Toronto Canada.

This questionnaire has been designed to give the doctor information as to how neck pain has affected patients ability to manage in everyday life. In this the patient has to answer every section and mark in each section only the ONE box which applies to patient. The neck disability index has high levels of reliability, validity and responsiveness. It's a self report measure of function used in patients with neck pain. It contains 10 questions and each has to be scored between 0 - 5 and the total score out of 50 was noted.

Following baseline examination participants were randomly assigned to two groups:

### **Group A- (Ergonomic intervention group)**

- Participants were given a copy of ergonomic guidelines. Participants were taught to follow ergonomic advice for 4 weeks.

**Ergonomic advice in physiotherapists may include:** Avoid repetitive movements as it may lead to fatigue, Avoid to maintain one position for prolong period of time, Proper care should be taken while transferring a patient, Proper position should be maintained while applying modalities.

**Proper workstation may include:** Lumbar, Thoracic or arm support in therapists chair, Position of treatment table, Edges of work surfaces should be comfortable, Proper ventilation

### **Group B- (Ergonomic intervention and Exercises group).**

Participants were taught isometric neck exercises: Participants were in sitting position on the chair. Participants were taught to do these exercises 1-2 times daily for 4 weeks.

**Isometric neck flexion** - They were taught to place their dominant hand flat on the forehead. Next, they were told to firmly push forehead against the right hand and hold for 5 seconds and were told to repeat 5 times.

**Isometric neck extension** - Participants were taught to place their dominant hand behind their head, over the occiput. Next, they were told to firmly push the head backwards against the hand, and hold for 5 seconds and repeat 5 times.

**Isometric neck side flexion** - Participants were taught to place the right hand flat on the right side of the head. Next, they were told to firmly push the head against right hand and hold for 5 seconds and

repeat 5 times. Same exercise was repeated with the left hand against the left side of the head.

**Isometric neck rotation** – Participants were taught to place the right hand on the right cheek. Next, they were told to firmly turn the face against the right hand and hold for 5 seconds and repeat 5 times. Same exercise was repeated with the left hand on the left cheek.

Participants were taught neck stretching 1-2 times daily for 4 weeks.

**Neck Extensors stretch**- They were taught to gently bend neck forward, as if to touch the chin to jugular notch, and hold the position for 10 seconds and repeat 5 times.

**Neck Flexors stretch** - Participants were taught to gently bend the neck backwards as much as possible and hold the position for 10 seconds and repeat 5 times.

**Neck side flexors stretch**- They were taught to gently bend their neck on the right side, trying to touch the ear lobe to the shoulder and hold the position for 10 seconds and repeat 5 times.

**Stretch for right side** - They were taught to gently bend their neck to the left side, trying to touch the

ear lobe to the shoulder and were told to hold the position for 10 seconds and repeat 5 times.

**Neck lateral rotation stretch**- They were taught to gently turn the neck to the right side, looking over the shoulder and were told to hold the position for 10 seconds and repeat 5 times.

**Stretch for Right side** - They were taught to gently turn the neck to the left side, looking over the shoulder and were told to hold the position for 10 seconds and repeat 5 times.

Participants were instructed to do the isometric exercises and neck stretching every 2 hours of their work.

Participants were instructed to follow the ergonomic guidelines regularly.

Participants were given a copy of ergonomic guidelines, same as was given to Group A. All the outcome measures were evaluated before starting the intervention and then after 4 weeks of treatment protocol.

Data collected was analyzed by various statistical methods such as mean, standard deviation and paired t- test.

## RESULT:

### Group A

**Table no 1 Represents Comparison of pre and post NRS of Group A.**

	Mean+-SD	T value	P value
Pre NRS Group A	50+-15.12	9.3737	<0.0001 Extremely statistically significant.
Post NRS Group A	30.67+-12.23		

**Table no.2 Represents comparison between pre and post Neck disability score of ergonomic group A.**

	Mean+-SD	T value	P value
Pre NDS of Group A	20.93+-11.73	4.7809	0.0003 Extremely statistically significant.
Post NDS of Group A	10.27+-5.85		

### Group B

**Table no.3 Represents comparison between pre and post NRS of Group B.**

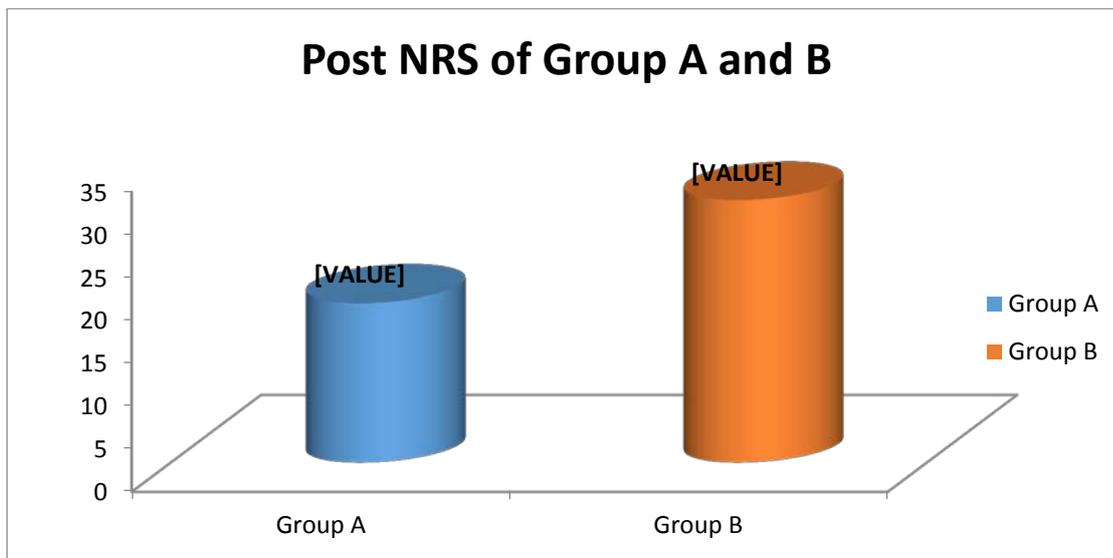
	Mean+-SD	T value	P value
Pre NRS Group B	58+-17.81	10.2484	0.0001 Extremely statistically significant.
Post NRS Group B	18.67+-8.34		

**Table no.4 Represents the comparison between Pre and Post NDS of Group B.**

	Mean+-SD	T value	P value
Pre NDS Group B	26.27+-13.92	6.6572	<0.0001 Extremely statistically significant.
Post NDS Group B	5.20+-3.99		

**Table no.5 Represents comparison between post NRS of Group A and Group B.**

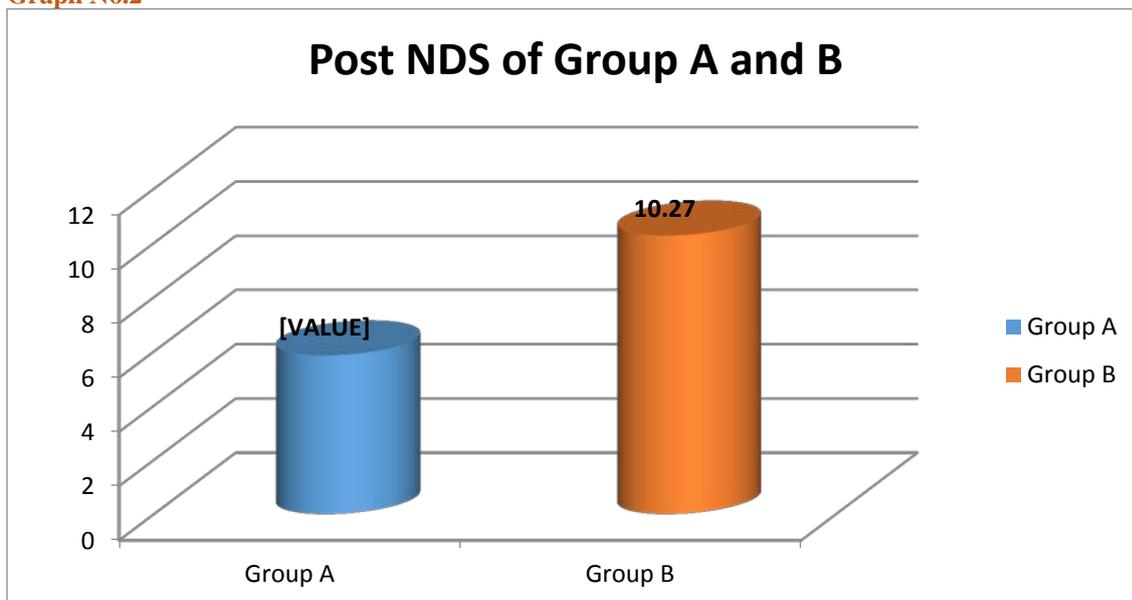
	Mean+-SD	T value	P value
Post NRS Group A	18.67+-8.34	3.1402	0.0040 Extremely statistically significant.
Post NRS Group B	30.67+-12.23		



**Graph.No.1**

Graph no.1 Comparison of post NRS of Group A and Group B, Where t value is 3.1402 and p value is 0.0040 which is extremely statistically significant.

**Graph No.2**



Graph no.2 Comparison of post NDS of Group A and Group B, Where t value is 2.7725 and p value is 0.0098 which is Very statistically significant.

## DISCUSSION:

In this study we have treated 30 participants with neck pain, amongst which 15 were treated by stretching, isometric neck exercises and ergonomics and remaining 15 were treated by ergonomic alone.

Observing the effectiveness of exercises and ergonomic intervention in reducing neck pain, the present study aimed at combining both of these interventions to explore if exercises together with ergonomic interventions proved to be more

beneficial than ergonomics alone for neck pain in physiotherapists. Following intervention the severity and incidence decreased for pain and disability.

Results of our study were similar to study did by Kilroy, Niamh in which they treated 47 female participants by giving advice on risk factors and physical work place change showed that ergonomic intervention resulted in an improvement in working posture and a decrease in musculoskeletal symptoms and body discomfort

.This study was done on female participants and ergonomic intervention was given. But in the study neck muscle exercises were not included in intervention.

The participants appreciated the ability to overcome the disabling effects of wrong posture and lack of physical exercise which were hindering their work performance. Participants also improved from psychological stress due to neck pain to feelings of control and empowerment over their health which affected their quality of life. Changes in behavior were also seen with participants reporting efforts to continue ergonomic guidelines even after work in other daily activities.

The participants received Stretching, isometric neck exercises and ergonomic advice. Following intervention the severity and incidence decreased. The improvement in symptoms is due to improvement in elasticity of muscle and by achieving comfortable muscle tone after stretching. The improvement in muscle strength is probably due to physiological effect of isometric exercises on neural factors such as increases in activation of motor units acting synchronously and reducing or counteracting inhibitory impulses.

### CONCLUSION:

The present study concluded that educating physiotherapists the importance of ergonomics and intermittent exercises protocol can reduce neck pain. Isometric neck exercises, Stretching and ergonomics are more effective than ergonomics alone.

Ergonomics are also found to be effective but it is more effective with Isometric neck exercises and stretching. So muscle strengthening exercises and ergonomic advice are essential components of the treatment of work related neck pain.

The present study concluded that strengthening and stabilization exercises is significantly effective on reducing pain, improving strength of weakened muscles in Playing Related Musculoskeletal Injuries in guitarist also Improving the performance and quality of life too.

### ACKNOWLEDGEMENT:

I have taken efforts in this project. However, it would have not been possible without the kind

support and help of many individuals .I would like to extend my sincere thanks to all of them.

### REFERENCES:

- [1] Are physiotherapy student at the risk of musculoskeletal pain,2014.Niraj Bharadwa, Mamata Rani.
- [2] Work related musculoskeletal disorders:A survey of physical therapists in Izmir-turkey,2004.Ysim salik and Ayse Ozcan
- [3] Work related musculoskeletal disorders in physical therapists,2000.Jean E Cromie, Valma J Robertson.
- [4] Esther Liyanage, Indrajith Liyanage, Masih Khan Department of Physiotherapy, FAHS, University of Peradeniya, Sri Lanka 2 Department of Physiotherapy, Kruphanidhi College, Bangalore, India
- [5] Aki E, Yavuz Y. Overuse syndrome and related problems in professional and student string players. *Pain Clinic* 2003;15:327-331.
- [6] Roset-Llobet J, Rosines-Cubells D, Salo-Orfila JM. Identification of risk factors for musicians in Catalonia (Spain).
- [7] *Med Probl Perform Artists* 2000; 15:167-174.
- [8] Zaza C, Farwell VT. Musicians playing-related musculoskeletal disorders: an examination of risk factors. *Am J Ind Med* 1997;32:292-300.
- [9] Vernon H, Mior
- [10] Brusky P. High prevalence of performance-related musculoskeletal disorders in bassoon players. *Med Probl Perform Artists* 2009;24:81-87.
- [11] Shikdar AA, Al-Kindi.
- [12] Kary TN, Gross A (2005)
- [13] Sandell C, Frykman M, Chesky K, Fjellman-Wiklund A. Playing-related musculoskeletal disorders and stress-related health problems among percussionists. *Med Probl Perform Artists* 2009;24:175-180.
- [14] Verdon ME. Overuse syndromes of the hand and wrist. *Prime Care* 1996;23(2):305.
- [15] De Smet, L., Ghyselen, H., & Lysens, R. (1998). Incidence of overuse syndromes of the upper limb in young pianists and its correlation with hand size, hypermobility and playing habits. *Chirurgie de la Main*, 17 (4), 309-313.
- [16] Fry, H.J.H. (1986). Prevalence of overuse (injury) syndrome in Australian music schools. *British Journal of Industrial Medicine*, 44, 35-40.
- [17] Furuya, S., Nakahara, H., Aoki, T., & Kinoshita, H. (2006). Prevalence and causal factors of playing-related musculoskeletal disorders of the upper extremity and trunk among Japanese pianists and piano students. *Medical Problems of Performing Artists*, 21 (3), 112-118.