

# Comparison of Effectiveness of Isometric and Stretching Exercise in Pain Management among the Forward Head Posture Patients

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## Abstract

**Background:** Forward head posture (FHP) is an exaggerated anterior lower cervical curve and posterior upper thoracic curve, leading to excessive anterior positioning of the head concerning a vertical reference line, accompanying rounded shoulders with thoracic kyphosis, this Occurs due to imbalance between posterior and anterior neck muscles, causing neck pain. Exercise treatments are effective in reducing FHP alongside associated neck pain.

**Methods:** A cross-sectional study was conducted from May to October 2019 on 60 patients diagnosed with FHP from different hospitals of Quetta and were equally distributed into two groups, each containing 30 participants. Group A was given stretching exercises and group B was given isometric exercises for 2 weeks. The visual analog scale was used to assess patients before and after treatment. Data were analyzed by Statistical Package for Social Sciences (SPSS) version 23.

**Result:** Patients were having a mean age of +30.42, Most of them were males (n=34, 57.0%) and from age group of 41-60 years (n=33, 55.0%). Moderate severity was reported by (n=41, 58.3%) and both cervical and thoracic regions were involved in (n=36, 60.0%). Before treatment most of patients were having pain intensity of 6 (n=21, 35.0%) and after treatment were having pain intensity 4 (n=24, 40.0%). There was no significant difference in pain reduction between both interventional groups.

**Conclusion:** The study concludes that both techniques, the isometric strength training, and stretching exercises are equally effective in correcting forward head posture and associated neck pain reduction.

**Keywords:** forward head posture, Neck pain, stretching exercise, isometric strength training, Visual analogue scale.

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## Introduction

An Exaggerated anterior lower cervical curve and posterior upper thoracic curve, is known as the forward head posture or turtle neck posture<sup>(1)</sup>. Forward head posture (FHP) is most often described as excessive anterior positioning of the head concerning a vertical reference line, involving increased cervical spine

lordosis (head forward, middle cervical spine extended, lower cervical spine flexed) and rounded shoulders with thoracic kyphosis<sup>(2)</sup>. Scapula rotates medially and overall vertebral height shortens<sup>(3)</sup>. There is an obliteration of the cervical lordosis with a compensatory tilting back of the head at the atlanto-occipital joint. Posteriorly, semispinalis cervicis and anteriorly Longus capitis become stretched and weak, while semispinalis capitis posteriorly and Longus cervicis anteriorly become overactive and shorten<sup>(3)</sup>. Jung Ho Kang et al states that forward head postures during computer-based work may contribute to some disturbance in the balance of healthy adults<sup>(4)</sup>. Age and gender were significantly related to neck and shoulder symptoms. Prevalence of neck-shoulder tension and neck-shoulder pain increases with age<sup>(5)</sup>. A study reported that even after body size and ergonomics are adjusted, women still are the higher risk group for back and neck pain<sup>(6)</sup>.

Previously, a study was conducted which states that cervical and thoracic stretching and strengthening exercise program can improve spinal posture alignment for decreasing forward head posture in subjects<sup>(7)</sup>. The isometric strength training, comprising of isometric contraction against gentle resistance, to forehead, occiput and temporal area may act to improve cervical muscle coordination and awareness of neck and head position<sup>(8)</sup>. Stretching intends to expand muscle-ligament flexibility, improve range of motion or musculoskeletal capacity, and prevent injuries. These includes static stretching (active and passive), dynamic stretching (active and ballistic), pre contraction stretching (PNF techniques) and post isometric contraction, post facilitation stretching and medical exercise therapy<sup>(9,10)</sup>. Previous studies conducted by Stephanie S Lynch et al, R.M. Ruivo et al and Yong-Soo Kong et al states that exercise interventions are affective in correcting FHP and shoulder protraction<sup>(11)(12)(13)</sup>. Bakhtiyar A et al and suggests that combination of stabilization and chin-tuck exercises provides the correction of FHP and effective and stable corrected posture<sup>(14)</sup>. Hyun Jae Noh et al states that neck stabilization exercises improve unbalanced neck muscle activation and reduces neck pain<sup>(15)</sup>.

The aim of this study was to assess comparison of effectiveness of isometric and stretching exercise in pain management among the forward head posture patients. We hypothesized that both interventions are equally

effective in correcting FHP and reducing neck pain.

## Methods

### Study Design Setting and Duration:

A cross-sectional study was conducted from May to October 2019. The data was collected from different physical therapy OPDs of Quetta, Pakistan.

### Sampling:

A convenient Non-probability sampling technique was used among 60 patients, included from different physical therapy OPD settings of Quetta, who were agreed to participate in the study. Patients were included with a confirmed diagnosis of forward head posture with neck pain between the age of 20 to 60 years, while patients with surgical intervention, malignancy, other pathology, severe pain, and those who were unwilling to sign an informed consent and unable to follow up exercise program were excluded from the study.

### Data Collection Tool

Visual analog scale (VAS) was used for data collection. VAS was completed by interview before and after 2 weeks of exercise program.

### Data Collection Procedure

The patients are equally distributed into two group A & B and each group contains 30 participants both male and female. Participants of Group A were given stretching exercise while the participants of group B were given isometric exercise treatment by their respective physiotherapists, among patients who were clinically determined as patient of forward head posture were included in the study and angle of forward head posture was measured with goniometer as per standard procedure.

### Data Analysis Procedure

Data was analyzed by using Statistical Package for Social Sciences (SPSS) version 23 and presented in frequency and percentage for categorical variables, mean values were presented for continuous variables.

### Ethical Considerations

As the approval was taken from Ethical review

board of Faculty of Pharmacy & Health sciences, University of Balochistan, Quetta Pakistan and for the data collection the prior permission was taken from the care takers of respective hospitals. Informed consent was

taken from the patients prior to data collection that their participation is voluntary, information of their responses will be kept confidential and they can leave the study anytime.

## Results

**Table 1: Demographic Characteristics.**

Demographics	Frequency (n=60)	Percentage (100%)
AGE		
20-40	27	45.0
41-60	33	55.0
GENDER		
Male	34	57.0
Female	26	43.0

### Demographic Characteristics of Patient

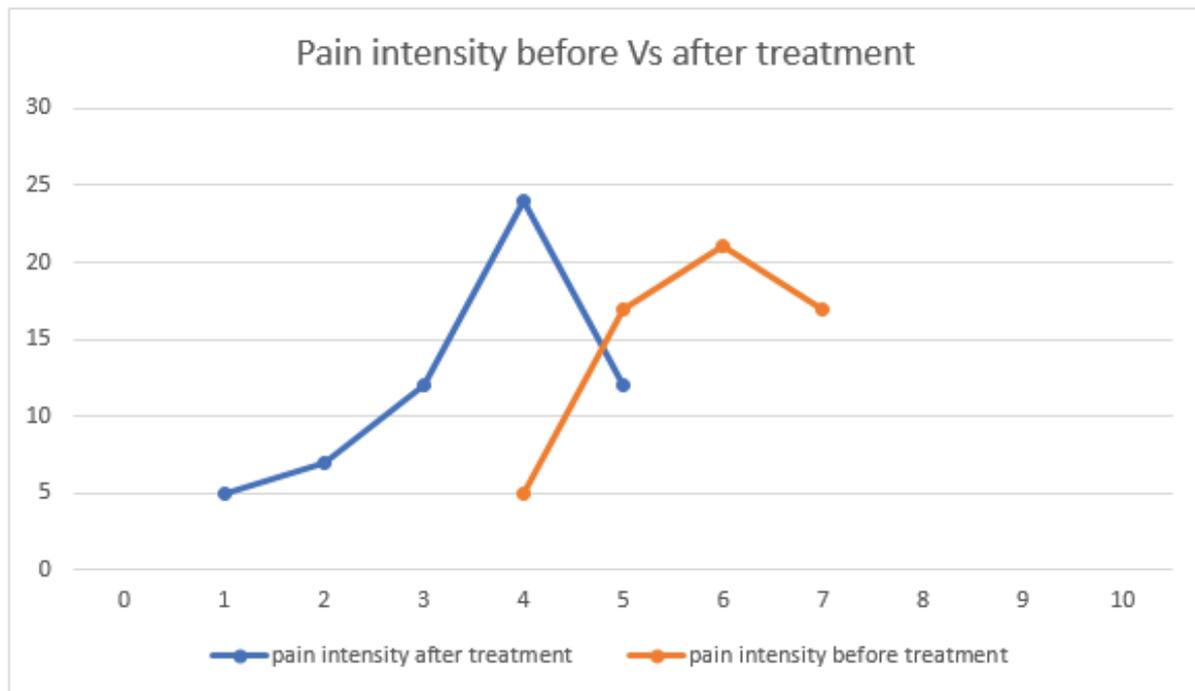
**Table 1:** shows the demographic characteristics of patients having mean age of +30.42. According to table most of the patients belongs to age group 41-60 years (n=33, 55.0%) and were males (n=34, 57.0%).

**Table 2: Severity and Area of Affection.**

Variables	Frequency (n= 60)	Percentage (%= 100.0)
Severity		
Mild	10	16.7
Moderate	41	58.3
Severe	9	15.0
Region Affected		
Cervical	22	36.7
Upper Thoracic	2	3.3
Cervical and upper thoracic	36	60.0

## Severity and Area of Affection

Table 2 displays disease characteristics in which severity was classified into mild, moderate, and severe. The majority (n=41, 58.3%) were moderate. Both regions, cervical and upper thoracic, were affected in majority (n=36, 60.0%).



**Figure 1: Represents visual analogue scale comparison before and after exercise prescription.**

### Represents visual analogue scale comparison before and after exercise prescription.

Figure 2 displays the comparison of pain intensity before and after treatment. Before treatment most of the patients were having pain intensity of 6 (n=21, 35.0%) and after treatment majority were having pain intensity of 4 (n=24, 40.0%). There was no significant difference in pain reduction between both interventional groups (isometric and stretching exercises). Both exercises are equal in pain reduction and correction of FHP.

## Discussion

The current study discloses that there is no significant difference in pain reduction and correction of forward head posture between stretching and isometric exercise which means both exercises are equally effective. The result of the current study was in line with study reported by Katherine Harman et al conducted study in 2005 in Nova Scotia, reported that 10 week

based exercise program which includes strengthening of deep neck flexors and shoulder retractors and stretching of neck extensors and pectoralis major muscle, were have significant impact on range of motion and postural alignment.<sup>(2)</sup> Similarly, Choi, Young-Jun et al conducted a study in 2010, which states that, cervical and thoracic stretching and strengthening exercise program can improve spinal posture alignment for decreasing forward head posture in subjects<sup>(7)</sup>. H. J. Noh et al, states that neck stabilization exercises improve unbalanced neck muscle activation and contribute to reducing neck pain<sup>(16)</sup>. R.M. Ruivo et al concluded that exercise intervention was successful at decreasing forward head and protracted shoulder in adolescents. Effects of training and detraining after 8 months stretching and strength training were demonstrated. Myoung-Hyo Lee and et al examined the effects of deep flexor muscle-strengthening exercise on the neck-shoulder posture, and the strength and endurance of the deep flexor muscles and concluded that, strengthening cranio-cervical flexor muscles is important for the adjustment of neck posture,

and maintaining their stability is required to improve neck-shoulder posture<sup>(17)</sup>. R.M Ruivo conducted study in 2016 in Portugal reported that 16 weeks based exercise program which includes stretching and strengthening exercises with postural education, were have significant impact on decreasing FHP but no significant impact on shoulder pain<sup>(18)</sup>. Study by Thavatchai Suvarnnato et al, stated that 6 weeks of training in both stretching and isometric strength training exercise groups can improve neck disability, pain intensity, CV angle, and neck-muscle strength in chronic mechanical neck pain<sup>(19)</sup>.

Rehabilitation of specific deep neck muscles helps improve neuromuscular control and reestablishes sensorimotor control of cervical spine. These programs are effective for restoration of motor function and proved to be beneficial for reducing neck pain recurrences<sup>(20)</sup>. To our knowledge FHP causes muscle imbalance between deep cervical flexors and cervical extensors. Leading to middle cervical spine extended, lower cervical spine flexed. Exercising deep cervical flexor muscles improve motor control and helps to correct muscle imbalance between superficial and deep layer of cervical muscles<sup>(21)</sup>. By training cervical flexor muscles, cervical lordosis can be corrected and so does non-specific neck pain, this opinion is supported by a study<sup>(22)</sup>.

On other hand deep cervical extensors muscles weakness also plays part in FHP and neck pain<sup>(3)</sup>. Therefore, rehabilitation program should also focus on these deep extensor muscles<sup>(23)</sup>. A study states that isometric exercise of deep extensors of neck increases strength of these muscles<sup>(24)</sup>. Therefore, this increase in strength of deep extensors reduces FHP. Cervical flexors as well as occipital extensor muscles become shortened in forward head posture<sup>(25)</sup>. Therefore, stretching of these muscles can increase muscle length and so does reduces FHP. Different studies such as conducted by Jun Hyung Cho et al, Seung Kyu Park et al<sup>(1)</sup>, and Syeda Nida Gillani et al, also supports this view. They state that stretching exercises are effective in increasing length of muscles, rom, and changes tone of muscles that are involved in FHP and so does are effective in reducing FHP.

Results of present study concludes that both exercise intervention the isometric strength training and stretching, are equally effective. The limitation of this study is that the targeted population was small. Further

studies are required that targets larger population.

## Conclusion

Both techniques the isometric strength training and stretching are equally effective in correcting forward head posture and associated neck pain reduction.

## Recommendation:

Strength exercises along with stretching are effective in treatment of FHP and should be incorporated in clinic and home exercise programs for chronic neck pain along with postural misalignments.

**Acknowledgements:** We acknowledge the support of hospital staff who helped us in data collection.

**Role of Funding Source:** No funding was achieved.

**Conflicts of Interest:** The authors hereby declare that there is no conflict of interest with this submission.

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