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Original Article

A Randomized Control Trial to Compare the Effects of Endurance Training Versus Strength Training Among Students with Neck Pain

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ABSTRACT

Neck pain is pain perceived as arising in a region bounded superiorly by the superior nuchal line and inferiorly by an imaginary transverse line through the spinous process of the first thoracic vertebra. Musculoskeletal disorders are common among general population; the yearly prevalence of neck pain is almost 30% to 50%. **Objective:** The purpose of this study was to compare the effects of endurance training versus strengthening exercises among students with chronic neck pain**. Methods:** It was Randomized Control Trial. A total of 30 patients were recruited into the study and were randomly allocated into two groups, the treatment group and control group. Treatment group received endurance therapy while control group was treated with strengthening exercises. Pre-test and post-test assessments were performed among both groups to compare the effect of these interventions. **Results:** Independent t-Test interpretation of PNS. Pre-treatment PNS for control group Mean=4.93, SD=1.53, p-value=.614, for experimental group Mean=5.20, SD=1.32, P-value=.614. According to results of Post-treatment PNS, there was significant reduction in pain intensity and p-value<0. 01i.e for experimental group Mean=0.40, SD=0.507, P-Value=0.000. Independent t-Test interpretation of duration of symptoms (DOS). Pre-treatment duration of symptoms for control group Mean=2.60, SD=.632, p-value=.148, for experimental group Mean=2.93, SD=0.594, P-value=.148 **Conclusion:** It is concluded that endurance exercises were more effective than strength training in improving chronic neck pain among medical students of RMU.

INTRODUCTION

The neck starts at the base of the skull and joins the thoracic spine via a sequence of seven cervical vertebrae [1]. The cervical spine is susceptible to developing a wide range of unpleasant disorders because of its complicated and complex structure, as well as the numerous loads and forces that can be applied to it by an injury or even just regular activities. The cervical spine plays a number of important roles [2]. Housing and protection of spinal cord. Facilitation of blood flow to brain. Supporting the head and its movements. Neck discomfort is pain that is believed to originate in an area that is bordered inferiorly by the spinous process of the first thoracic vertebra and superiorly by the superior nuchal line [3]. Neck discomfort has been linked to a number of different reasons, including infection, chemical or mechanical trauma, and high levels of physical and psychological stress [4]. This occupational group frequently adopts a prolonged forward head posture, which may be linked to musculoskeletal disorders [5]. According to biomechanics, prolonged forward neck flexion increases compressive strain on the cervical spine

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and causes a creep response in the nearby soft tissues [6]. The main cause of pain is overuse of the muscles in the cervical and shoulder girdle, particularly during repetitive low-load tasks that encourages over activity of low threshold motor units [7]. Due to static incorrect head posture, cervical stabilizer muscles may become painful or tight, resulting in neck pain with or without cervicogenic headaches [8]. The most common early symptom of a chronic musculoskeletal condition linked to neck discomfort is neck stiffness, which may or may not be accompanied by headaches [9]. This occupational group frequently adopts a prolonged forward head posture, which may be linked to musculoskeletal diseases. Numerous studies [10] have demonstrated a link between neck pain and a decline in health-related quality of life (HRQoL). Spasms of the shoulders and back muscles can be caused by a variety of things, including long-term popularization of forward head posture [11]. One of the most prevalent postural changes in people with neck disorders is a forward head posture [12]. In comparison to those who do not have neck-shoulder disorders, patients with these disorders have a more severe forward head posture, and their scapular acromion protrudes [13]. NSAIDs and muscle relaxants are two medications used to treat neck discomfort pharmacologically [14]. Mechanical neck pain is relieved immediately and permanently by stretching and isometric exercises combined with ergonomic modification [15]. Low power laser (830 to 904 nm) electrotherapy for mechanical neck discomfort immediately reduces pain and improves function [16]. Ergonomic changes lead to an improvement in working posture and a decrease in the frequency of musculoskeletal problems. Stretching and isometric workouts serve to increase muscle strength, flexibility, and range of motion [17]. Both the sub occipital release technique and the craniocervical flexion exercise have been used to improve forward head position. To assess the effectiveness of endurance training for the treatment of neck pain among medical students.

METHODS

Sample size was thirty n=30. Sampling method was Simple Random sampling and allocation between groups was done using sealed envelope method. Male and female students having neck pain at least once in the last month. Age group of 18 to 30 years. Patients with chronic neck pain due to faulty head posture. Exclusion Criteria: Fracture of cervical spine, Cervical Spondylolisthesis, Tumors of spine, Systemic disorders, Cervical radiculopathy. Structured Questionnaire and Pain Numeric Scale NDI (The NDI contains 10 item with 7 related to daily activities, 2 related to pain, and 1 related to concentration [21]. Thirty patients in total were chosen and randomly divided into the treatment group and the control group. For two months, interventions were used three to four times each week. Each individual did 10–12 repetitions of a weight that they could lift ten times on the first training session (ten repetitions maximum) and worked their way up to fifteen repetitions in phase one. For four weeks, they remained at this level. In phase two, subjects worked out for three sets of 15-20 repetitions at maximal load after the initial 10 repetitions, with a minute of rest in between sets. The subjects in the Control group underwent a specially created strength training program that included cervical isometrics. This training regimen was divided into two halves. both the first and second phases last for four weeks. Each participant did 5–10 repetitions of a weight that they could lift 10 times during the first training session (10 repetitions maximum) in phase one, working their way up to a load that could be accomplished for a maximum of 12 repetitions. For four weeks, they remained at this level. Phase two saw the patients performing three sets of five to ten repeats of the initial twelve to fifteen repetitions at their maximum load, with a minute of rest in between sets.
Data was entered and analyzed using SPSS version 21.0. Cross tabulation and multiple bar charts were used to present the data. Independent samples t-test was applied at 5% level of significance to compare the means of two study groups for the continuous outcome variables.

RESULTS

Comparison of pre- and post-treatment effects of pain on sleeping and reading between groups. The experimental group's sleep and reading quality significantly improved because of a significant reduction in pain-related disruption.

Group		Mean±SD	S.E	P-value
PRE-PAIN& SLEEPING	Control Group	2.73±.704	.182	.087
	Experimental Group	3.13±.516	.133	.088
POST-PAIN SLEEPING	Control Group	1.87±.640	.165	.000
	Experimental Group	1.07±.258	.067	.000

Table 1: independent t-test for pre and post-treatment effect of pain on sleep

Comparison of pre- and post-treatment effects of pain on duration of symptoms between groups. The experimental group's sleep and reading quality significantly improved because of a significant reduction in pain-related disruption.

Group		Mean±SD	S.E	P-value
PRE-DURATION OF SYMPTOMS	Control Group	2.60±.632	.163	.148
	Experimental Group	2.93±.594	.153	.148
POST-DURATION OF SYMPTOMS	Control Group	1.53±.516	.1330	.000
	Experimental Group	1.00±0.000	.000	.001

Table 2: independent t-test for pre and post-treatment duration of symptoms

Comparison of pre- and post-treatment effects of pain on

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reading and watching TV between groups. The experimental group's sleep and reading quality significantly improved because of a significant reduction in pain-related disruption.

Group		Mean±SD	S.E	P-value
PRE-Reading And Watching TV	Control Group	2.60±.632	.163	.018
	Experimental Group	3.20±.676	.175	.018
POST-Reading And Watching TV Week8	Control Group	1.60±.632	.1630	.001
	Experimental Group	1.00±0.000	.000	.003

Table 3: Independent T-test for pre- and post-treatment effect of pain on reading and watching TV

Interpretation of the Experimental group's paired t-test. P-value of pre-PNS-post =0.000, P-value of pre-DOS-post =0.000, or p0.01 results, indicated that the findings were significant. Thus, the null hypothesis was disproved.

Group		Paired Differences	
		Mean±SD	P-value
Pair 1	Pre-PNS_Post-PNS	4.800±1.424	.000
Pair 2	Pre-pain and sleeping post-pain and sleeping	2.067±.458	.000
Pair 3	Pre-Duration of symptoms Post-Duration of symptoms	1.933±.594	.000
Pair 4	Pre-pain and Reading Post-pain and Reading	2.200±.676	.000

Table 4: paired samples-test experimental group

DISCUSSION

The comparison of strength training with endurance training for students with chronic neck discomfort to reduce pain and stiffness was the focus of my study. While the control group engaged in strength training for the purpose of reducing neck discomfort and symptoms, the experimental group was told to engage in endurance training with appropriate rest periods. Thirty students with chronic neck pain in total were chosen for this study from Rawalpindi Medical University and Allied Hospitals using purposive sampling. Following simple random sampling, equal patients were divided into the Control and Treatment groups. Ages of the subjects ranged from 18 to 30 years old. Data were gathered using a questionnaire based on the Neck Disability Index and the Pain Numeric Rating Scale. The assessment factors were pre- and post-training questionnaire scores based on NDI and PNS. Evaluations were given to the control and intervention groups. Cross tabulation between the two groups for pre- and post-treatment PNS revealed that most patients in both groups had pre-treatment PNS with pain levels between 3 and 8, while post-treatment PNS data revealed that pain levels had decreased to levels between 0 and 4 under control conditions and 0 to 1 under experimental conditions. Pre-treatment symptom duration for both groups ranged from less than one hour to more than four hours. Post-treatment symptom duration showed a significant reduction in duration, with the experimental group's duration equal to normal all-time and the control group's duration equal to less than an hour. Pain Numeric Scale interpretation and analysis within and within groups using a one-way ANOVA test. Pre-PNS P-value was 0.614, Week 4 P-value was 0.39, and Week 8 P-value was 0.000. The pre- and post-treatment means and level of significance (p-values) above support the conclusion that endurance training is superior to strength training in reducing chronic neck discomfort in students. The significance level estimated in the tables shows that progressive endurance therapy, as opposed to progressive strength training, is more effective in helping students with their bad neck posture and chronic cervical pain. A study by Sadarat Borisu [7] compared the impact of endurance training against strength training on persistent neck discomfort. His research's findings indicated that combining physical activity regimens could lessen neck pain and disability. Another study found that among females with persistent neck pain, twelve months of neck strength or endurance training significantly improved HRQoL compared to the control group. One year of either endurance or strength training seems to slightly improve the HRQoL. In order to alleviate non-specific chronic neck pain, Saeed Akhter and his colleagues [18] compared the effectiveness of manual therapy combined with an exercise program to an exercise program alone. According to the results, both groups' levels of pain intensity significantly decreased after three and twelve weeks, respectively. When compared to an exercise regimen on its own, manual therapy (manipulation) with a treatment plan seems to be preferable. L.L. Andersen used a study to examine the efficacy of short daily doses of progressive resistance training for chronic neck/shoulder discomfort. Limited to moderate evidence has been found in systematic reviews to support the usefulness of physical activity in treating neck and shoulder pain [19]. In this study by R.M. Ruivo, the forward head posture and extended shoulder posture of Portuguese teenagers were examined as a result of a 32-week resistance and stretching exercise program used in physical education classes. The effects of detraining after 16 weeks were also evaluated. Adolescents' forward head and prolonged shoulders were successfully reduced by the exercise intervention [20]. All of these research' findings, as interpreted, confirm my own findings that gradual endurance training is helpful for neck pain. The combination of several manual physical training routines also alleviated neck discomfort and stiffness, according to the data. Independent t-Test for comparisons of groups' pre- and post-treatment data The results of the paired t-test within group demonstrate that my null hypothesis was disproved and the study hypothesis—according to which Endurance Training was more effective than Strength Training in reducing student neck pain—was accepted. My

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study hypothesis is supported by one-way ANOVA-based statistical analysis of data between and within groups for pre- and post-treatment data, and the null hypothesis was rejected since the p-value was less than 0.05, indicating that the test results were significant.

CONCLUSIONS

It is concluded that endurance exercises are more effective than strength training in improving chronic neck pain among students.

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