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Effectiveness of Resistance Training using TheraBand on Pain, Neck Disability and Quality of life in Desk job Workers with Chronic Neck Pain

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ABSTRACT

Background: Neck pain is an extremely common musculoskeletal disorder often observed in desk job workers. It's a frequent cause of disability, leading to human suffering and impacting individuals' well-being**.** The aim of this study was to determine whether TheraBand intervention is a useful adjunct to traditional neck pain treatment for people who work desk jobs.

Materials and methods: For a period of six weeks, thirty individuals, aged 25 to 55, were randomized toeither the experimental group, which received resistance band exercises in addition to conventional treatment, or the control group, which received only conventional treatment. The Neck Disability Index (NDI), the SF-36, and the Numeric Pain Rating Scale (NPRS) were used to measure pain, disability, and quality of life, respectively.

Results: In the 2-way mixed-model ANOVA for neck pain ($F = 3.230$, $do = 1$, $P = .04$) and disability ($F = 5.53$, $do = 1$, $P = .04$), the findings showed a significant group-by-time interaction. In comparison to the Control group, the Experimental group showed a considerably higher improvement in pain and impairment. Additionally, notable distinctions were noted between the two cohorts concerning the aspects of quality of life related to general health, emotional difficulties, emotional well-being, role restrictions resulting from physical health, and physical functioning ($p<0.05$).

Conclusion: The results revealed that for desk job workers with chronic neck pain, adding TheraBand exercises to conventional treatment is more beneficial than using conventional treatment alone in terms of improving pain alleviation, lowering disability, and raising overall quality of life.

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INTRODUCTION

Neck pain is an extremely common musculoskeletal disorder often observed in desk job workers. It's a frequent cause of disability, leading to human suffering and impacting individuals' well-being. In research, the 12-month prevalence of neck pain in office workers was found to be 45.5% [1] Several studies have shown that neck pain is linked to diminished HRQOL. While a consensus measure to assess Health-Related Quality of Life (HRQOL) in people with neck pain does not yet exist, researchers have used a variety of assessment instruments, such as the SF-36 and its corresponding subscales [2]

Especially after the pandemic and the shift to remote work, increased use of modern technologies has led to changes in behaviors, making people more sedentary and promoting improper body habits. Posture, a crucial factor, is significantly affected. In desk jobs, maintaining a constant forward head posture for prolonged periods is common. This contributes to Forward Head Posture (FHP), a prevalent neck disorder resulting from prolonged incorrect posture. FHP occurs when the head's position shifts anteriorly to the center of gravity, causing instability not only in the cervical spine but also in the musculoskeletal system, leading to chronic neck pain [3]. Treating neck pain, particularly among desk job workers, is essential as their forward posture strains muscles and predisposes them to faulty posture, muscle imbalance, and potential herniated disc issues that compress nerve roots.

A multimodal physiotherapy program, including electrotherapy, exercises, education, and ergonomics, is effective in reducing chronic neck pain. Isometric exercises enhance muscle performance, and posture correction is recommended for desk job workers with poor neck posture. Strength training, including dynamic resistive exercises with tools like the TheraBand, is beneficial in alleviating neck pain.

Resistance band comes with color-coded to indicate resistance levels, is widely used for fitness and strength training [4]. Some potential benefits of TheraBand-based strength training compared to conventional strength training can be that resistance bands are lightweight and portable, making them easy to carry and use in various settings, such as at home, at work in office or while traveling. This versatility allows for a more flexible and accessible workout routine.

This research aimed to assess the effectiveness of resistance training using the TheraBand on pain, neck Disability and the quality of life in desk job workers with chronic neck pain.

Study Design and participants

A comparative experimental study was carried in the Physiotherapy OPD of DPSRU, Delhi. A total 30 desk job workers were selected by the convenience sampling method on the basis of inclusion and exclusion criteria. All the subjects who had chronic neck pain (pain more than 3 months) were included in the study. After explaining procedure to all the subjects regarding the intervention of resistance band exercises, informed consent was taken. Exclusion criteria were any history of psychiatric illness, acutely ill patient and alcoholic patient, patient with severe neurological injury, recent head injury or cervical fracture.

Randomization

On the basis of baseline assessment, patients were randomly assigned to receive strength training program using resistance band exercises, and conventional treatment for chronic neck pain. All the subjects included in the study were divided into 2 groups, Experimental group (Group A) and control group (Group B) with same number of subjects (n=15).

Procedure

The research committee of Delhi Pharmaceutical Sciences and Research University, Delhi's School of Physiotherapy gave its approval to the study. Before

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beginning the study, participants received information in Hindi or English regarding the relevance, possible advantages, and general goal of the research, and their informed consent was obtained. Group A (experimental, n = 15) and Group B (control, n = 15) comprised the 30 desk job workers who were chosen based on inclusion and exclusion criteria. The experimental group, designated as Group A, undertook a training regimen comprising resisted exercises for cervical flexion, extension, left and right flexors, and left and right rotators utilizing TheraBand. Color-coded elastic resistance bands were used for these workouts, which were done while wearing a head harness. Subjects finished two sets of ten to fifteen repetitions, with mild fatigued on the final set. When subjects could accomplish three sets of eight to twelve repetitions, the resistance was gradually raised.

Group B, the control group, on the other hand, underwent hot water fermentation in addition to isometric neck exercises that targeted the flexors, extensors, side flexors and rotators of both sides. In addition to stretching tense neck muscles, the hot water fermentation treatment took place for ten to fifteen minutes each day. For six weeks, both groups followed their individual workout schedules five times a week.

Outcome measures

During the course of the intervention, the data was recorded and documented at baseline, at the end of third week and at the end of sixth week for the experimental and control group for pain using NPRS scale, muscle strength using manual muscle tester, neck disability using NDI and quality of life using SF-36 questionnaire.

Data analysis

Version 24 of SPSS software was used for data analysis, whereas Microsoft Excel was used for data entry. Both analytical tools (Shapiro-Wilk test) and visual tools (histograms, probability plots) were used to evaluate the normal distribution of the variables. A 2-way mixed-model analysis of variance (ANOVA) was used to examine the effects of the treatment on pain, disability, and quality of life while taking into account the two groups (Experimental and Control). Pairwise comparisons using the Bonferroni correction were carried out in order to find any statistically significant differences in change scores between groups. These comparisons examined group differences from the beginning of therapy to the end of it.

RESULTS

The demographic findings for both the groups are shown in Table 1.

Variables	Experimental	Control
Age	32.55 +/- 4.88	31.40+/- 5.40
BMI	24.01+/- 1.49	23.90+/- 2.43
Gender n (%)	9(30)	8(26.7)
Female Male	6(20)	7(23.3)
Exercise Habits		
Yes	7(23.3)	6(20)
No	8(26.7)	9(30)
Job Experience (Years)	7.2 +/- 3.4	7.8 +/- 2.4
Pain history (Years)	2.8 +/- 1.2	3.1 +/- 0.2
Screen Usage (hrs per day)	7.8 +/- 2.3	8.0 +/- 1.2

TABLE 1- DEMOGRAPHIC DETAILS AND VARIABLES AT BASELINE

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PAIN	**Baseline**	**3rd Week**	**6th Week**
Experimental	6.50 ± 0.85	4.40 ± 0.71	2.00 ± 0.68
Control	6.25 ± 0.68	6.10 ± 1.14	5.40 ± 1.52
Within the group difference			
Experimental		1.85 (2.51 – 1.18) *	4.25 (5.09 – 3.40) *
Control		0.40 (0.69 – 0.10) *	1.10 (1.52 – 0.67) *
Between Group Difference		1.70 (-2.31-1.08)	3.40(-4.15-2.64)
NDI			
Experimental	19.60 ± 2.84	13.70 ± 1.65	7.80 ± 1.26
Control	19.10 ± 3.21	13.30 ± 3.11	4.35 ± 1.70
Within the group difference			
Experimental		5.90 (8.92 – 2.87)	11.80 (14.45 – 9.15) *
Control		5.80 (8.28 – 3.32)	13.60 (16.03 – 11.16) *
Between Group Difference		0.40(-1.99-1.19)	0.45(-2.01-1.21) *

ns – Nonsignificant, (*)- Significant

TABLE 2 - COMPARISON OF PAIN AND NDI FOR BOTH THE GROUP

Regarding neck pain, the 2-way, mixed-model ANOVA findings showed a significant group-by-time interaction (F = 3.230, do = 1, P =.04). Neck pain in the patients in the Experimental group showed a more noticeable improvement than those in the Control group. On the Neck Disability Index (NDI), a significant group-by-time interaction was also noted (F = 5.53, do = 1, P =.04). The Experimental group showed much better improvement in pain alleviation and decreased neck disability than the Control group did.

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Variable	Baseline	3rd Week	6th Week
PHYSICAL FUNCTION			
Experimental	530.00+/-154.82	640.00+/-	850.00+/-
Control	461.00+/-160.98	555.00+/-	765.00+/-
Within the group difference			
Experimental		-94.0 (-135.39-	-389.00(459.84-
Control		-110 (-182.26-	-260.00(-326.38-193.61) *
Between Group difference		85.00(14.74	-260.00 (-326.38-193.61) *
Emotional Problem			
Experimental	361.00+/-45.00	396.00 +/-	484.00+/-
Control	294.00+/-58.61	350.00 +/-36.99	428.00+/-55.97
Within the group difference			
Experimental		20(-4.09 44.09) *	-160.0(-232.26 -87.73) *
Control		50(9.60 90.40) *	-60.00(-121.41 -1.417) *
Between Group difference		46.00(-46.97-46.90) *	56.00(-46.90-46.90) *
Physical Health			
Experimental	210.00+/-133.37	280.00+/-89.43	350.00+/-51.29
Control	180.00+/-150.78	240.00+/-104.63	300.00 +/-91.76
Within the group difference			
Experimental		-70(-108.56 -31.43)	-140(207.06-72.93)
Control		-60(-99.94 -20.05)	-120(172.50-67.49) *
Between Group difference		40.00(102.31-22.31)	50.00(97.59 -2.41)
Energy/ Fatigue			
Experimental	234.00 +/-34.39	262.00+/-45.37	344.00+/-47.50
Control	226.00+/-27.60	258.00+/-32.37	328.00+/-49.58
Within the group difference			
Experimental		-36.00 (-50.0 -21.95)	-118.00(-144.08-91.91)
Control		-24.00(-39.97-8.02)	-94.00 (123.52-64.47)
Between Group difference		4.00(29.23-21.23)	16.00(47.08-15.08)

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Emotional well Being			
Experimental	316.00+/-45.00	396.00+/-78.29	484.00+/-76.11
Control	294.00+/-58.61	350.00+/-36.99	428.001+/-55.97
Within the group difference			
Experimental		-102.00(-143.81-60.11) *	-190.00(-240.02-139.97) *
Control		-34.00(-48.30-19.69)	-112.00(-155.16-68.84)
Between Group difference		46.00(85.19-6.08) *	56.00(98.76-13.23) *
Social function			
Experimental	130.00 +/-36.63	147.00+/-32.546	187.00+/-17.206
Control	115.00+/-34.02	142.00+/-29.132	185.00+/-17.014
Within the group difference			
Experimental		-27.5(-40.06-14.99)	-62.5(-92.07-52.92)
Control		-17.5(-24.40-10.60)	-55.0(-72.55-37.44)
Between Group difference		5.00(14.72-24.77)	2.00(13.45-8.45)
General Health			
Experimental	297.50+/-76.47	307.50+/-74.38	317.50+/-49.00
Control	257.50+/-63.99	287.50+/-57.64	277.50+/-37.08
Within the group difference			
Experimental		-30.5(-39.47-21.52)	-20.5(-29.46-70.46)
Control		-10(-17.37-2.62)	10.00(-71.04-51.04)
Between Group difference		20.00(22.59-62.59)	10.00(17.81-37.81)
Pain			
Experimental	130+/-33.40	182+/-16.58	197.50+/-10.27
Control	121+/-35.61	177+/-17.50	193.50+/-7.69
Within the group difference			
Experimental		-55.50(-82.84-28.15)	-76(-95.31-56.68)
Control		-52.50(76.93-28.06)	-63.5(-82.11-44.88)
Between Group difference		5.00(16.41-5.41) *	4.00(1.81-9.81) *

ns – Nonsignificant, (*)- Significant

TABLE 3 –CHANGES IN COMPONENTS OF SF-36 FOR BOTH THE GROUP

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There is a significant difference between the two groups in terms of physical functioning, role restrictions because of physical health, role limitations because of emotional difficulties, emotional well-being, and general health ($p<0.05$) as indicated by the results shown in Table 3. On the other hand, there were no statistically significant changes seen in the Quality of Life (QOL) energy/fatigue and social functioning components ($p>0.05$).

DISCUSSION

Neck pain is a growing concern that affects people all over the world. It can cause significant discomfort and reduce productivity, making it a problem for families, communities, and even businesses. It's important to be aware of the causes of neck pain and find ways to alleviate it. The aim of this study was to investigate the impact of resistance training using TheraBand on pain, neck disability index, and quality of life in desk jobworkers with chronic neck pain. TheraBand-based strength training is a form of resistance exercise that uses elastic resistance bands instead of traditional weights or machines. [5] While both TheraBand-based and conventional strength training were found to be effective, TheraBand-based training led to significant and better improvements in terms of percentage for most of the study variables i.e. pain, muscle strength and quality of life of patients with chronic neck pain. This finding implies that resistance band exercise could be a valuable method for managing chronic neck pain in desk job workers.

TheraBand resistance bands provide a variable and accommodating resistance throughout the range of motion. This feature can be particularly beneficial for individuals with joint issues or those in need of rehabilitation exercises, as it places less stress on the joints compared to heavy weights [6] Literature also reports that therabands lead to greater activation of stabilizing muscles. This can improve balance and proprioception, which are essential for overall functional fitness. Resistance bands come in various colors, each offering a different level of resistance. This allows for progressive overload, enabling users to gradually increase resistance as their strength improve. TheraBand exercises can involve multidirectional resistance, which helps engage different muscle groups and replicate functional movements better than traditional strength training exercises that usually focus on linear movements [7,8]

Pain

The exercise intervention was targeted towards reducing pain by strengthening the weakened muscle groupsthat are commonly associated with chronic neck pain, such as the neck flexors, extensors, left and right-side flexors, and left and right rotator muscle groups. According to our research, Group A was successful in reducing pain, with the experimental group experiencing a 55% greater reduction in pain than the control group. This suggests that the intervention may be an effective method for managing chronic neck pain in desk job workers. This could be probably since strengthening muscles using resistance exercises helps to support and stabilize joints, reduces stress on bones and ligaments. Exercises to strengthen the muscles necessary for proper posture often target these muscles. By exercising these muscles, individuals can improve their posture and reduce discomfort caused by poor posture or muscle imbalances.

Strength training and other physical exercises are thought to release endorphins, which are natural pain relievers and mood enhancers. As a result, pain perception can be reduced and overall well-being can be improved. Research shows that strength training can reduce the chronic inflammation that is associated with arthritis and fibromyalgia. Strength training often includes movements that improve joint range of motion and flexibility. Pain and discomfort caused by stiffness or restriction of movement can be relieved by increased mobility. The researchers also concluded that strength training can improve nerve-muscle

communication through neuromuscular adaptations. As a result, injuries and pain can be reduced through better control and coordination of movements [9,10,11]

NDI

The results showed a significant reduction in neck disability measured by neck disability index. Group A showed an 18.7% more reduction in disability from baseline period to end of sixth week. The use of TheraBand for strength training significantly reduced disability in the experimental group in this study. Several mechanisms can be used to reduce neck impairment by engaging in regular and targeted strengthening exercises for these muscles, including strengthening the neck muscles, which improve their ability to support and stabilize the neck during daily activities and reduce stress on the cervical spine.

Muscles that are stronger are better able to withstand the demands of daily movement and reduce fatigue- related pain and disability. Strengthening the neck helps balance the body and reduce stress on the neck and disability. It is postulated that strong neck muscles provide better support for the joints of spine which can lead to reduced pain and disability [12,13,14]. In addition, strengthening neck muscles makes everyday tasks easier and more efficient for, which means that one can do them more easily and with less handicap [15,16]

Quality of life

Results showed that there was a significant difference between both groups for most of the components of quality of life i.e. the physical functioning, role limitations due to physical health, role limitations due to emotional problems, Emotional well-being, General health in both groups ($p<0.05$). No significant differences were seen for social functioning and energy/fatigue components of QOL.

In present study experimental group showed improvement by 60.3% in physical functioning, 53.16% in Emotional problems, 66.6% in Physical health, 47.01% in Energy fatigue, 53.1% in Emotional well-being, 44.2% in social functions and 51.9% in Pain component compared to control group.

In a study published in the Journal of Orthopedic & Sports Physical Therapy in 2016[17] researchers conducted a study to evaluate the efficacy of neck specific exercises in patients with chronic pain in the neck. The results of the study indicated that participants who completed a twelve-week program of progressive resistance training of the neck muscles demonstrated considerable reductions in pain intensity and neck disability, as well as improvements in health and quality of life. They found that neck exercises can be a great way to help people with chronic neck pain and improve their quality of life.

Another study looked at how neck and shoulder exercises can help people with neck pain. It was done in 2017 and looked at people with chronic pain in their necks. They went through an 8-week exercise program that focused on strengthening their neck and shoulders. The study found that after the exercise, the pain intensity went down, the person with the neck disability got better, and they had a better quality of life which is similar with present study.

Inclusion of TheraBand exercises in addition to conventional treatment was superior to conventional treatment alone for improving Pain, disability, muscle strength and quality of life in desk job workers with chronic neck pain. The study has clinical implications for physiotherapists that a treatment program that includes both conventional treatment and neck stabilization exercises using therabands may be more beneficial than conventional treatment alone for patients with chronic neck pain.

CONFLICT OF INTEREST

None

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