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Influence of classical massage on pain and functional state of people with lumbar discopathy

Wpływ masażu klasycznego na dolegliwości bólowe i stan funkcjonalny osób z dyskopatią lędźwiową

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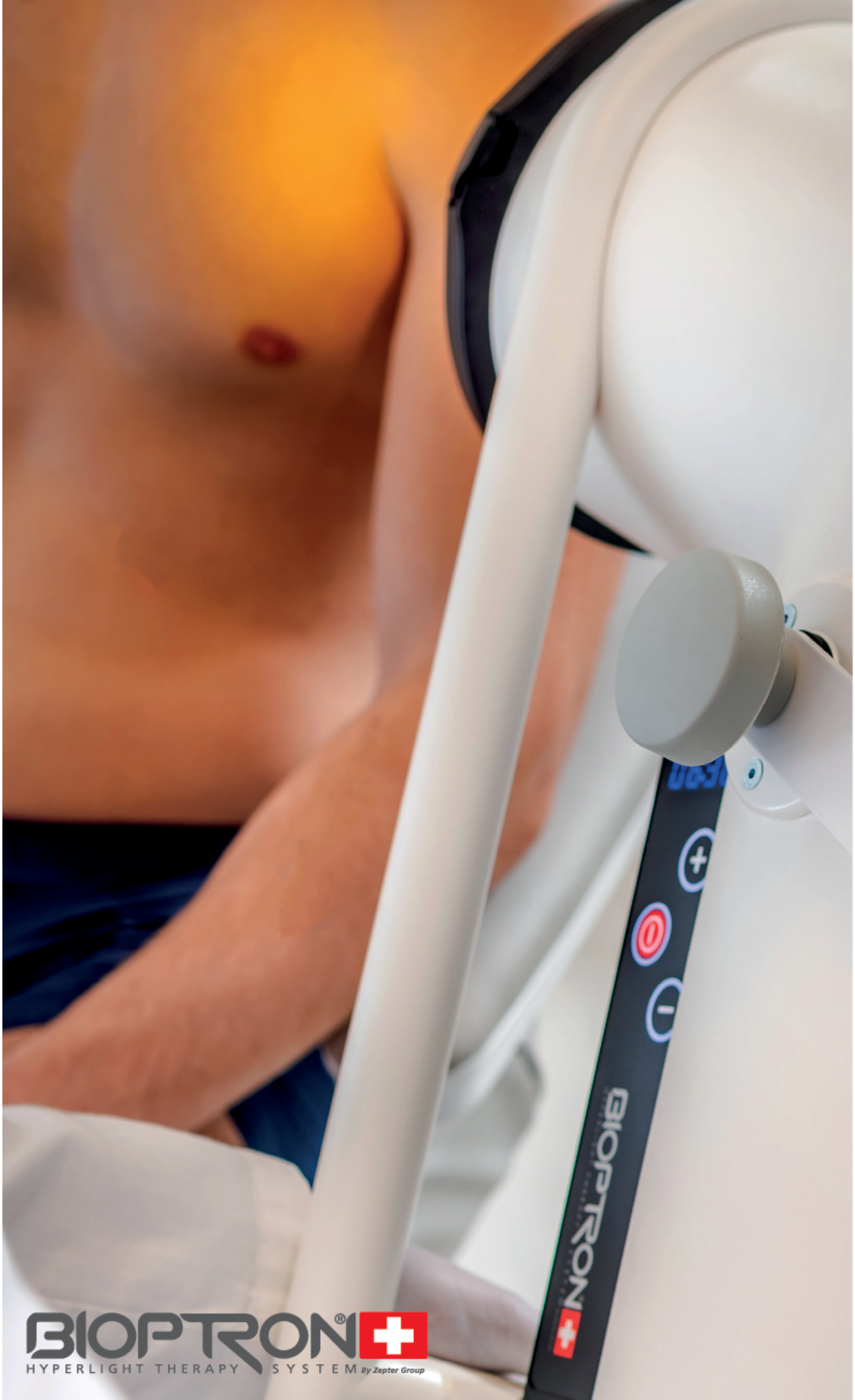

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Dzień 9 lipca 2020 roku był dla METRUM CRYOFLEX wyjątkowy, ponieważ właśnie w tym dniu firma została partnerem Polskiego Związku Narciarskiego. Dla polskiej marki, od ponad 29 lat produkującej nowoczesny sprzęt do rehabilitacji i fizjoterapii, była to duża nobilitacja, ale też dodatkowa motywacja do dalszego rozwoju.

Cała załoga METRUM CRYOFLEX od zawsze trzymała kciuki za Narodową Kadrę Skoczków Narciarskich, a od lipca 2020 roku może wspierać ich również sprzętowo.

Skoczkowie polskiej kadry są pod doskonałą opieką profesjonalnego sztabu, który codziennie dba o ich dobrą kondycję i zdrowie. METRUM CRYOFLEX poprzez podpisaną umowę stało się częścią tego medalowego zespołu, a dostarczony przez nich sprzęt pomaga w regeneracji skoczków po obciążających treningach i zawodach, umożliwiając szybki powrót do formy.

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- aparaty do terapii wibracyjnej.

Pełna oferta:

fizjoterapia polska
nr 3/2021 (21)

Deep cervical flexor pressure biofeedback exercise versus integrated neuromuscular inhibition technique in chronic mechanical neck pain: a randomized controlled trial

Ćwiczenie głębokich zginaczy szyjnych przy użyciu Pressure Biofeedback oraz zintegrowana technika hamowania nerwowo-mięśniowego w przewlekłym mechanicznym bólu szyi: randomizowane badanie kontrolowane

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Abstract
Purpose. This study conducted to compare between the effect of deep cervical flexor pressure biofeedback exercise and Integrated neuromuscular inhibition technique on treatment of chronic mechanical neck pain. Materials and methods. Forty-five patients (34 females, 11 males), with age (27.47 ± 3.29) years with Chronic mechanical neck pain randomly assigned into three equal groups, Group (A): received Deep cervical flexor pressure biofeedback exercise plus traditional program, Group (B): Integrated neuromuscular inhibition technique plus traditional program and Group (C) only traditional program (Infrared, Ultrasonic, and massage) for three weeks, three sessions per week. The outcomes measured by inclinometer for cervical range of motion assessment in six directions, visual analogue scale for pain and neck pain disability index for functional disability, before and after treatment. Results. within group analysis revealed significant difference in range of motion, pain and neck pain disability index before and after the treatment in the three groups as $p < 0.05$, and between group analysis revealed significant difference of range of motion, pain after treatment in favor to group A, as $p < 0.05$ while no significant difference between group A, B in NDI as $P > 0.05$. Conclusions. Deep cervical flexor biofeedback exercise and Integrated neuromuscular inhibition technique are effective modalities for treating chronic mechanical neck pain with superior effect of Deep cervical flexor biofeedback exercise.

Key words:
Deep cervical flexor, pressure biofeedback exercise, Integrated neuromuscular inhibition technique, Mechanical neck pain, Neck pain disability index

Streszczenie
Cel. Badanie to przeprowadzono w celu porównania wpływu ćwiczenia głębokich zginaczy szyjnych przy użyciu pressure biofeedback i zintegrowanej techniki hamowania nerwowo-mięśniowego na leczenie przewlekłego mechanicznego bólu szyi. Materiały i metody. W badaniu wzięło udział czterdziestu pięciu pacjentów (34 kobiety, 11 mężczyzn), w wieku (27,47 ± 3,29) lat z przewlekłym mechanicznym bólem szyi losowo przydzielonych do trzech równych grup: Grupa (A): ćwiczenia głębokich zginaczy szyjnych przy użyciu pressure biofeedback plus tradycyjny program; Grupa (B): zintegrowana technika hamowania nerwowo-mięśniowego plus program tradycyjny i Grupa (C) tylko program tradycyjny (podczerwień, ultradźwięki i masaż) przez trzy tygodnie, trzy sesje w tygodniu. Wyniki mierzone za pomocą inklinometru do oceny zakresu ruchu kręgosłupa szyjnego w sześciu kierunkach, wizualnej skali analogowej dla bólu i wskaźnika niepełnosprawności funkcjonalnej wynikającej z bólu szyi przed i po leczeniu. Wyniki. W ramach analizy grupowej wykazano istotną różnicę w zakresie ruchu, bólu i wskaźnika niepełnosprawności wynikającej z bólu szyi przed i po leczeniu w trzech grupach na poziomie $p < 0,05$; analiza międzygrupowa wykazała istotną różnicę w zakresie ruchu, bólu po leczeniu na korzyść
grupy A na poziomie $p < 0,05$, natomiast brak istotnej różnicy między grupami A, B w zakresie wskaźnika niepełnosprawności wynikającej z bólu szyi na poziomie $p > 0,05$. Wnioski. Ćwiczenia głębokich zginaczy szyjnych przy użyciu biofeedback i zintegrowana technika hamowania nerwowo-mięśniowego są skutecznymi metodami leczenia przewlekłego mechanicznego bólu szyi; lepsze wyniki osiągnięto w przypadku stosowania ćwiczeń głębokich zginaczy szyjnych przy użyciu biofeedback.

Słowa kluczowe:
Głębokie zginacze szyjne, ćwiczenia przy użyciu biofeedback, zintegrowana technika hamowania nerwowo-mięśniowego, mechaniczny ból szyi, wskaźnik niepełnosprawności wynikającej z bólu szyi

Introduction

Neck pain considered as a common major prevalent musculoskeletal complain, which reported a high recurrences and chronicity, Various studies revealed that neck pain affects about 70% of the people through lifespan [1,2]. Chronic mechanical neck pain is known as pain cervical region has a consistent symptoms duration more than three months empathized with some pathomechanics of the neck [3]. mainly identified by the muscular imbalance between deep and superficial neck flexors and a marked decrease of strength and endurance of deep neck flexors (DNF) mainly (Longus Capitis and Longus Colli) and typically increased superficial muscle activity (Strenocleomastoid and Anterior Scalenes) compared to normal subjects [4, 5].

The deep cervical flexor biofeedback exercise targets the activation of deep cervical flexor muscles to provide an upright antigravity posture of the neck spine and reverse the forward distracted head position also supporting and straightening the cervical lordoic curve as motor control training approach [6]. On the other side of comparison, The integrated neuromuscular inhibition technique (INIT) owes the heterogeneity of nonmanual such as strain-counterstrain technique and manual techniques such as ischemic compression technique on treating knotted point of muscles allowing more pain free ROM, mainly based on the reciprocal inhibition neuromuscular phenomenon of post isometric relaxation to lessen muscle spasms in in the region of the pain suggesting the eliminating of pain, muscle fatigue and promoting the muscle functionality [7]. This study aimed to compare the effect of deep cervical flexor pressure biofeedback exercise and Integrated neuromuscular inhibition technique on treatment of chronic mechanical neck pain. This may help physical therapists in decision making and provide basic information about the most appropriate program, which can be chosen for management of chronic mechanical neck pain. It was hypothesized that both treatments would be similarly effective on decreasing chronic mechanical neck pain.

Material and Methods

Study Design

This study was designed as a randomized controlled clinical trial, attempted at the outpatient clinic of Physical Therapy faculty, Cairo university, Egypt. The research ethical committee of the Faculty of Physical Therapy, Cairo University, Egypt approved the current study by the number NO: P. T.REC/012/002377 and the study was registered at Pan African Clinical Trial Registry PACTR (Registry ID PACTR202008598885040). The study was performed between September 2019 and February 2020. Current search was guided by the (CONSORT) reporting trails guidelines.

Participants

A convenient sample of Forty-five patients (34 females, 11 males) were recruited from the Faculty of Physical Therapy, Cairo University, Egypt. They were enrolled and assessed for their eligibility to participate in this study. They were included based on inclusion criteria of both genders, randomly allocated in three equal groups after signing on the consent form agreement. Their age ranged from 19 to 36 years [8], and their body mass index (BMI) was not > 29.9kg/m2. Also, pain cervical region has a consistent symptoms duration more than three months related to pathomechanics of the neck region [7]. Patients were excluded if they had Vestibular and neurological system diseases, acute inflammatory and systematic disorders and symptoms of radiating pain, loss of sensation or reflexes, disc prolapse [8].

Randomization

The patients were divided randomly into Group (A): received Deep cervical flexor Stabilizer pressure biofeedback exercise plus the traditional treatment of Chronic mechanical neck pain, Group (B): received Integrated neuromuscular inhibition technique, plus traditional treatment, Group (C): received the traditional treatment only (Infrared, Ultrasonic, and massage) by a blinded, independent research assistant who used a random cards generated automatically by a computer (Figure 1).

Outcome measures

Visual Analogue Scale (VAS)

The Pain intensity was scored by visual analogue scale (VAS) which was presented a line of 10 cm long; one end of the line labeled no pain or discomfort (score zero) and the other end of the line denoting worst pain (score ten), VAS is recognized as a valid and reliable pain intensity assessment tool [9]. subsequently the patients of the current study were requested to mark the point of VAS line the accurately described their pain.

Neck Pain Disability Index (NDI)

Physical function of the cervical spine was assessed by the neck pain disability index(NDI) outcome score which is highly comparable and valid region-specific measure and function sensetive[10], NDI listed ten items each item scored form (0 point) no activity limitation (5 points) extensive activity limitation, items were clearly explained to patients who were instructed to score each item that precisely (form 0 to 5) according their function then score of NPI was totalized that scores(0-4) points no activity limitation,(5-14) points mild activity limitation,(15-24) points moderate activity limitation, (25-34) points activity limitation and (35-50) points complete limited activity[10].

Cervical Range of motion (CROM)

Inclinometer measurements was performed to assess the range of motion (ROM) of cervical spine typically in the 6 fundamental directions: cervical flexion, extension, left and right lateral flexion, and left and right rotation, Inclinometer is considered as reliable and valid method of ROM measurement with ICCs ranging from.89 to.94 and having good construct validity [11]. As a standard measuring position, the inclinometer was accurately placed over the vertex of patient head in neutral starting position, form well stabilized sitting position on thoracic supporting chair, the patient attempted three repetitions actively of neck extension, flexion, and both left and right directions of lateral flexion and rotation, until the ROM was end felt by muscle tightness with 30 seconds rest between. in this order, soft tissue excursion can be maintained [11]. Inc-

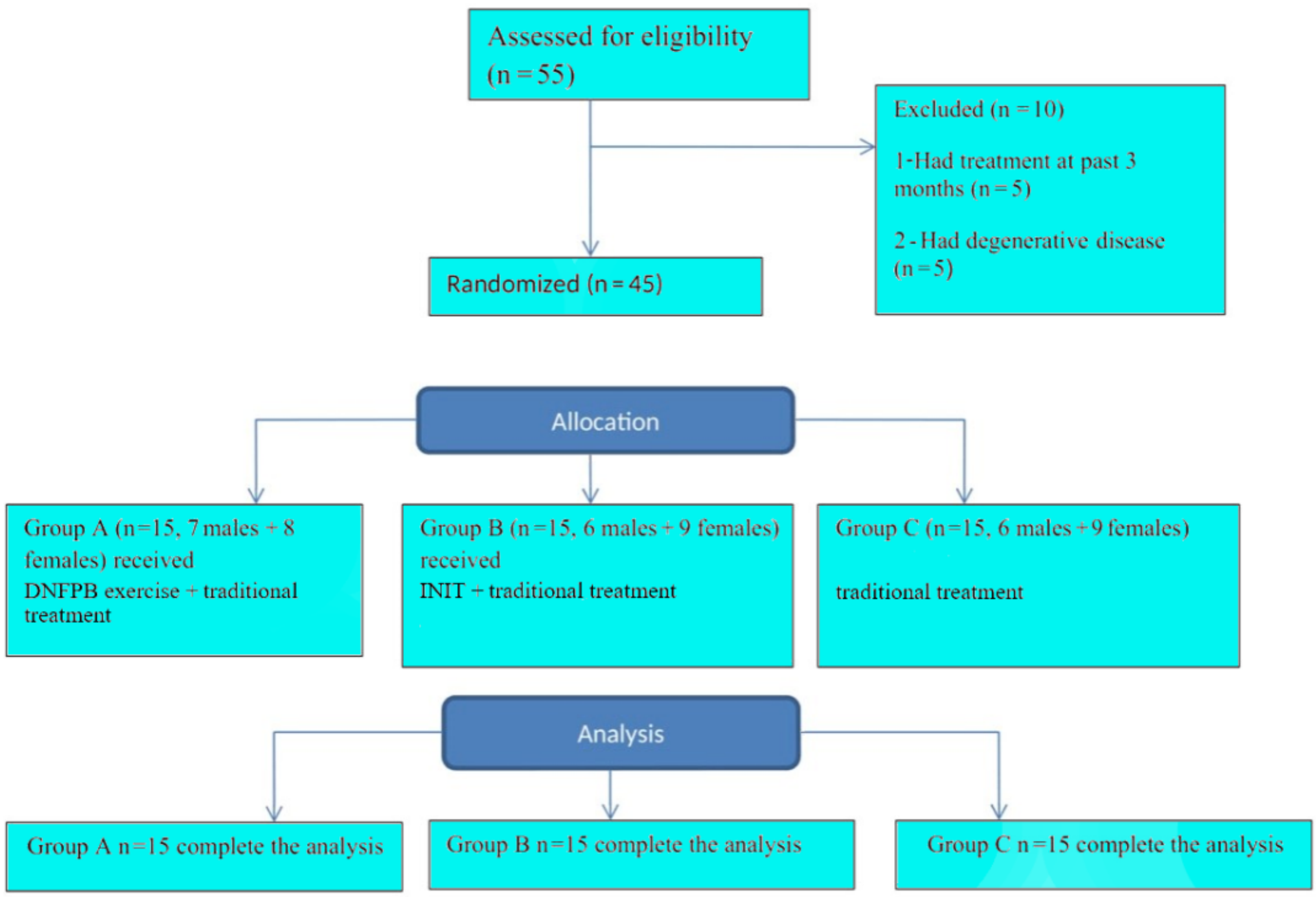

Figure 1. CONSORT Flow chart of patients in the current study

linometer score readings recorded in degrees of both directions as the difference between the end and neural start position, then the mean difference of The patient's three repetition was obtained for statistical analysis [12].

Interventions

Deep cervical flexor stabilizer biofeedback exercise

Patient was positioned in crock lying position with an inflatable air pressure sensor of the stabilizer biofeedback unit (StabilizerTM, Chattanooga Group Inc) behind the cervical lordosis, that was inflated 20 mmHg, which was adequate to inflate full distance between plinth and patient's neck without excessive flexion. The patient was instructed to tuck his chin inward (figure 2). subsequently The contraction of the deep neck flexors leading to the slight flattening of the cervical lordosis pressing inflated pneumatic sensor, the increased pressure instantly was monitored visualizing the patient amount of contraction, which has been known as the activation score and the highest score was steady held for with 10-second holds a total of 10 reps with 5 second rest pauses in between [13].

Integrated Neuromuscular Inhibition technique INIT

The multifaceted approach INIT was applied to the patients in the following sequence:

1. Ischemic compression: Initially, myofascial trigger points were allocated by flat palpation technique, then progressive compression releases were applied intermittently for 2 min each point by therapist thumb pressure for upper trapezius levator scapulae and splenius capitis muscle) form supine position [8].
2. Strain-counter strain: the patient was maintained (20-30 seconds) in a position of ease till the pain begun to relief typically for positional release concept [8].
3. Muscle energy technique: an isolated isometric contraction was applied to the hyper activated muscle which was maintained for 7-10 seconds then stretch soft-tissue for 30 seconds, three times repetition during the treatment session as a deactivation technique [8].

Traditional techniques

Infrared radiation

Patient was positioned in sitting back supported position exposing Infrared as a form of superficial dry heat which was applied perpendicular on cervical spine. The device had a power of 400w, voltage 203v and frequency of 50/60Hz [14].

Ultrasonic device

The patients received Ultrasonic(US) application (1 MHz frequency, continuous mode US, 1.5 watt/cm² dose) bilaterally paravertebral (C2-T1) for 8 minutes' form sitting back supported position [15].

Figure 2. The stabilizer biofeedback unit placement monitoring the deep neck flexor amount of contraction

Massage
Patient was positioned in sitting back supported position, Traditional soft tissue medical massage was performed in form of (effleurage, compression s, suboccipital release) bilaterally cervical paravertebral soft tissue for 10 minutes [16].

Sample size and Statistical analysis
The sample-size of the study was mathematically quantified by G*Power (version 3.1.9.2), relying on a pilot study on 10 patients, for an alpha level of 0.05, the effect size of the primary outcome measure of VAS (Visual Analogue Scale) pain scores was 0.289, with a power of 80%, So the quantified desired minimum sample size was 42 patients. To compensate the expected drop-out rates, Forty-five patients were required. Statistical analysis was performed by statistical SPSS Package program version 25, demographic data was analyized by Analysis of variance ANOVA and chi squared test. Normality tests of Shapiro-Wilk concluded a normally distributed of the tested variables. Levene's homogeneity of variance test for proved that there was no significant difference ($P > 0.05$), so mixed MANOVA (multivariate Analysis of the variance) test was used for statistical analysis, where p value was ≤ 0.05.

Results
Statistical tests revealed no violations of the assumptions of normality and homogeneity of variance for any of the dependent variables. Results revealed non-significant differences ($P > 0.05$) between the three groups regarding to demographic characteristics as shown in Table (1).

Table 1. Demographic and clinical characteristics of participants in all groups

Items	Age [year]	Weight [kg]	Height [cm]	BMI [kg/m^2]
Group A	27.47 ± 3.29	74.00 ± 8.37	164.93 ± 7.86	27.31 ± 3.51
Group B	25.80 ± 3.55	72.27 ± 9.69	162.87 ± 5.33	27.18 ± 2.88
Group C	24.60 ± 3.58	78.47 ± 6.56	165.47 ± 4.62	28.44 ± 2.22
F-value	2.572	2.221	0.760	0.845
P-value	0.088^{NS}	0.121^{NS}	0.474^{NS}	0.437^{NS}

Data are expressed as mean ± standard deviation P-value: probability value NS: non-significant

Multivariate tests for outcome measures indicate a statistically significant effects for group (F = 7.669, p = 0.001, Wilks' Lambda = 0.31), time (F = 34.607, p = 0.001, Wilks' Lambda = 0.218), and group-by-time interaction (F = 4.999, p = 0.001, Wilks' Lambda = 0.433). Within group analysis revealed a statistical significant reduction ($p < .05$) for Pain and Neck disability index while there was significant increase ($p < 0.05$) for ROM of flexion, extension, right and left side bending and rotation in the both studied groups (A and B) only. Comparing the results among the three tested groups, it was revealed that there was a significant improvement ($p < .05$) in the post-testing mean values of VAS, neck disability index and ROM of ROM of flexion, extension, right and left side bending and rotation in the experimental group (A) and group (B) compared with the control group (C). There was significant difference in the post-testing mean values of Pain and ROM between the experimental groups (A) and (B) in favor of group (A). While There was no significant difference in the post-testing mean values of NDI between the two experimental groups (A) and (B) Table (2).

Table 4. Comparison between pre and post-treatment mean scores of OMS, CTCS and VAS in the both groups

		Group (A) (n = 15)	Group (B) (n = 15)	Group (C) (n = 15)	Group A Vs. B p- value*	Group A Vs. C p- value*	Group B Vs. C p- value*
VAS	Pre-treatment	5.02 ± 0.58	4.93 ± 0.40	4.53 ± 0.61	0. 298^{NS}	0. 298^{NS}	0. 298^{NS}
	Post-treatment	3.34 ± 0.39	4.03 ± 0.58	4.22 ± 0.50	0.002^{S}	0.001^{S}	0.001^{S}
	p- value (% of improvement)**	0.01^{S} (33.47%)	0.001^{S} (18.26%)	0.001^{S}(6.84%)			
Neck pain diaability index	Pre-treatment	42.40 ± 4.42	40.13 ± 4.50	41.07 ± 7.05	0.600^{NS}	0.600^{NS}	0.600^{NS}
	Post-treatment	28.13 ± 8.50	30.40 ± 5.46	37.86 ± 5.97	0.948^{NS}	0.001^{S}	0.001S
	p- value (% of improvement)**	0.01^{S} (33.66%)	0.001^{S} (24.25%)	0.001^{S} (7.8%)			
ROM of Extension (°)	Pre-treatment	22.87 ± 3.15	22.87 ± 3.15	22.87 ± 3.15	0.693^{NS}	0.693^{NS}	0.693^{NS}
	Post-treatment	34.07 ± 3.51	33.00 ± 3.44	29.33 ± 3.71	0.001^{S}	0.001^{S}	0.001S
	p- value (% of improvement)**	0.01^{S} (48.97%)	0.001^{S} (26.92%)	0.001^{S} (7.66%)			
ROM of Flexion (°)	Pre-treatment	21.57 ± 3.35	23.33 ± 3.97	27.27 ± 3.28	0.98^{NS}	0.98^{NS}	0.98^{NS}
	Post-treatment	35.77 ± 3.21	30.07 ± 4.25	29.47 ± 3.06	0.001^{S}	0.001^{S}	0.001S
	p- value (% of improvement)**	0.01^{S} (60.03%)	0.001^{S} (28.89%)	0.001^{S} (8.07%)			
ROM of right side bending (°)	Pre-treatment	30.47 ± 6.87	31.07 ± 3.97	32.00 ± 3.46	0.98^{NS}	0.98^{NS}	0.98^{NS}
	Post-treatment	45.53 ± 5.69	39.13 ± 4.42	34.20 ± 4.36	0.001^{S}	0.001^{S}	0.001^{S}
	p- value (% of improvement)**	0.01^{S} (40.43%)	0.001^{S} (27.94%)	0.001^{S} (9.88%)			
ROM of left side bending (°)	Pre-treatment	33.33 ± 7.00	31.67 ± 3.67	32.00 ± 3.35	0.98^{NS}	0.98^{NS}	0.98^{NS}
	Post-treatment	46.93 ± 8.15	40.33 ± 3.47	34.93 ± 3.17	0.001^{S}	0.001^{S}	0.001^{S}
	p- value (% of improvement)**	0.01^{S} (48.85%)	0.001^{S} (25.63%)	0.001^{S} (6.83%)			
ROM of right rotation (°)	Pre-treatment	46.53 ± 8.38	41.53 ± 3.15	42.00 ± 2.53	0.98^{NS}	0.98^{NS}	0.98^{NS}
	Post-treatment	66.80 ± 5.84	53.47 ± 5.59	45.13 ± 4.64	0.001^{S}	0.001^{S}	0.001^{S}
	p- value (% of improvement)**	0.01^{S} (43.1%)	0.001^{S} (29.4%)	0.001^{S} (7.4%)			
ROM of left rotation (°)	Pre-treatment	45.73 ± 9.20	41.87 ± 3.75	43.00 ± 3.20	0.98^{NS}	0.98^{NS}	0.98^{NS}
	Post-treatment	68.07 ± 7.54	52.60 ± 6.24	45.93 ± 5.89	0.001^{S}	0.001^{S}	0.001^{S}
	p- value (% of improvement)**	0.01^{S} (48.85%)	0.001^{S} (25.63%)	0.001^{S} (6.83%)			

** Inter-group comparison; ** intra-group comparison of the results pre- and post-treatment. Data expressed by mean ± SD, NS p > 0.05 = non-significant, S p < 0.05 = significant, p = Probability*

Discussion

The current study was performed to compare effects of the Deep cervical flexor Stabilizer pressure biofeedback exercise to the effect of Integrated neuromuscular inhibition technique in the treatment of Chronic mechanical neck pain. According to inferential statistical results, there was Statistical significant difference of pain, and cervical ROM in all six directions after Deep cervical flexor Stabilizer pressure biofeedback exercise to the effect of Integrated neuromuscular inhibition technique with favor to Deep cervical flexor Stabilizer pressure biofeedback exercise, and no significant different in NDI between both techniques as both techniques are significant difference when each compared to traditional group.

Current study results were in consistency with Suvarnnato et al. [17]. stated that pressure biofeedback (PB) training is more relevant for decreasing neck pain, also, Lee and Kim18proved that PB training has a higher effect of promoting active cervical movements.

Watson and Trott [18] explained the potentially superior effect of the DNF with PB training over strength endurance exercises of globe cervical muscle due to the selectively use of the DNF training before strengthening of the superficial cervical muscles is more corrective cervical muscular imbalance, forward head posture and cranio-vertebral angles than nonspecific strengthening of neck muscles and gaining more isometric endurance of the DNF.

Spence et al. [19] demonstrated the advantage of PB exercise for musculoskeletal endurance due to conscious improvement of both frequency of discharge of the active motor neurons and the number of motor units recruitment, rate of firing, motor unit synchronization by visual cueing.as motor learning approach which needs information as proprioception over range of motion to improve muscular functionality.

Similarly, current study findings on pain intensity agree with Iqbal et al. [20] explanation of pain reduction mechanisms of DNF exercises through the biochemical reactions of training-related release of β- endorphins and endogenous opioids of pituary gland as a result to activation of ergoreceptors during muscle contractions which subsequently block both peripheral and central pain. Additionally, DNF exercise promotes muscle-tendon proprioceptors, stretch reflex-related responses through operant conditioning theory of repeated positive reinforcements. And readjusting the muscle pain – tension cycle, constricted circulation and myofascial pain.

However, Nezamuddin, et al. [21] supported the PB exercise to highly preferable for neck pain, PB exercise not recommended as monotherapy modality as adding other nesseccary to regain patient daily function Ballantyne et al. [22] revealed that A visco-elastic is more relevant to increased muscle length, the factor was achieved by a constant stretch force performed inIntegrated Neuromuscular Inhibition technique (INIT) subsequencely increasing muscle extensibility generating more muscular torque, and deformates the soft tissue barriers that restrict ROM which explain the equality of effectiveness in improving function as much as the PB with DNF method.

In contrary to current study results Nagrale et al. [8] preferred (INIT) to be more effective in pain relief, increasing functional activity when compared to muscle techniques in isolation.

Study Limitation

Current study had some limitations as insufficient investigator blinding and relatively short duration time of treatment for long term follow-up assessment.

Conclusion

the Deep cervical flexor Stabilizer pressure biofeedback exercise and Integrated neuromuscular inhibition technique are both effective in treatment of Chronic mechanical neck pain by improving functional disability with a superior effect of deep neck flexors pressure biofeedback exercise improve pain and range of motion of neck

Recommendations

Addition of proprioceptive varieties with core stability exercises is highly recommended for research.

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