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Effects of Myofacial Release and Deep Muscle Exercises on Neck Pain, Range of Motion, Pressure Threshold and Muscle Strength.

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INTRODUCTION

Excessive and repetitive use of smartphones and digital devices continuously increases neck imbalance, head posture is maintained by non-reducible structures, and abnormal posture causes pain and joint movement limits when the correct structure of the head, neck, and shoulder is broken, resulting in muscle imbalance when the wrong posture continues for a long time. This posture causes problems with the operability of the thoracic vertebrae and causes more pressure on the surrounding spine of the thoracic vertebrae with reduced movement, resulting in repeated vicious cycles of pain in the neck and waist.

This study purpose examine the relevance of each exercise and the clinically effective exercise methods by identifying changes in pain scale, neck disability index (NDI), range of motion (ROM), pressure threshold, and muscle strength to myofacial release and deep muscle exercise.

METHODS

1. Participants

Participants in the study 15 men and women in their 20s and 30s with neck pain to 5 SBG (Sling + Ballance Group), 5 PBG (Pressure Biofeedback + Ballance Group), and 5 CG (Control Group).

Table 1. Characteristic of participants

Variable	SBG (N=5)	PBBG (N=5)	CG (N=5)
Age (year)	25.60±2.30	25.60±3.78	25.20±3.27
Weight (kg)	57.78±12.28	63.06±13.47	73.70±13.42
BMI (kg/m)	22.20±4.81	23.08±2.55	25.08±3.27
Fat (%)	27.60±6.89	27.40±1.22	26.24±6.94
Muscle (kg)	22.76±2.48	25.28±5.28	30.00±5.48
SBP (mmHg)	116.60±7.30	115.60±11.39	123.80±18.22
DBP (mmHg)	68.40±4.66	68.00±6.42	77.80±12.61
HR (purse)	84.20±9.93	74.80±12.11	71.20±5.93

Data:Mean±SD, BMI:Body mass index, SBP:systolic blood presuure, DBP:disatolic blood pressure, HR:heart rate

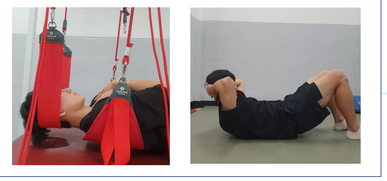
2. Measurements

Neck pain have been measure visual analoge scale(VAS), neck disability index(NDI), range of motion(ROM), and in muscle strength. The measurements were Neck Disability Index (NDI) and the to measure the neck movement flexion, extension, lateral flexion, rotation range of motion and the pressure threshold of the upper trapezius(Micro FET3, Hoggan, USA). Round shoulder posture (RSP) and grip strength were measured.

3. Exercises

Each exercise for two weeks, 30 minutes three times a week.

- Sling + Ballance Exercise
  1. Cervical Retraction 10s * 5set
  2. Cervical Lateral Flexion 10s * 5set
  3. Cervical Rotation 10s * 5set
  4. Cervical Extension 10s * 5set
  5. Thoracic Movement 10times * 3set
  6. Thoracic Release 40s * 3set



- Pressure Biofeedback + Ballance Exercise
  1. Pressure 22mmHg 10s * 5set
  2. Pressure 24mmHg 10s * 5set
  3. Pressure 26mmHg 10s * 5set
  4. Pressure 28mmHg 10s * 5set
  5. Pressure 30mmHg 10s * 5set
  6. Thoracic Movement 10times * 3set
  7. Thoracic Release 40s * 3set

*Setting pressure 20mmHg

RESULTS

1. Changes in VAS, S-scale and RSP according to neck exercise for 2 weeks

Right round shoulder posture showed interaction effect on the measurement time and group ($p < .05$) <Table 2>.

Table 2. Changes in VAS, S-scale and RSP according to neck exercise for 2 weeks

		SBG (N=5)	BFBG (N=5)	CG (N=5)	P
VAS(point)	Pre	5.40±1.51	5.00±1.00	2.20±1.48	a.014 b.043
	Post	4.00±2.64	1.50±2.12	3.25±1.96	c.197
NDI(point)	Pre	14.00±3.08	12.66±3.51	7.00±4.30	a.003 b.102
	Post	9.4±3.13	10.66±2.08	6.20±4.14	c.128
S-scale (point)	Pre	20.00±5.24	22.00±5.00	18.00±4.69	a.693 b.739
	Post	19.20±5.35	22.66±3.05	19.20±4.65	c.317
Rt. RSP(cm)	Pre	4.90±0.55	6.95±.091	5.16±0.76	a.330 b.508
	Post	5.66±1.23	5.25±0.35	5.32±0.31	c.048
Lt. RSP(cm)	Pre	5.80±1.05	6.35±1.20	5.23±0.68	a.288 b.495
	Post	5.40±.96	6.00±0.00	5.92±0.28	c.689

Data:Mean±SD, VAS;visual analoge scale, NDI;neck disability index, S-scale;smartphone-scale, Rt. RSP;right round shoulder posture, Lt. RSP;left round shoulder posture, a:time, b:group, c:time×group

2. Changes in ROM according to neck exercise for 2 weeks

Right lateral flexion of SBG, PBBG and CG ($p < .001$), extension($p < .05$), right rotation ($p < .05$) there was an interaction effect on the time and group <Table 3>.

Table 3. Changes in ROM according to neck exercise for 2 week

(Unit : °)

		SBG (N=5)	BFBG (N=5)	CG (N=5)	P
Rt. LF	Pre	40.66±4.04	51.00±7.07	43.50±7.77	a.607 b.653
	Post	55.33±4.50	37.50±3.53	45.60±9.87	c.001
Lt. LF	Pre	40.66±5.68	45.50±10.60	41.00±7.07	a.522 b.984
	Post	42.33±3.51	36.00±8.48	42.03±3.07	c.490
Flexion	Pre	50.00±4.58	42.00±5.65	62.50±0.70	a.231 b.037
	Post	54.00±7.81	42.50±3.53	62.34±.1.50	c.309
Extension	Pre	62.33±17.55	53.50±7.77	73.00±4.24	a.323 b.408
	Post	64.33±3.21	51.00±2.82	74.94±4.24	c.048
Rt. ROT	Pre	83.33±4.04	53.00±7.07	84.00±0.00	a.031 b.001
	Post	88.66±2.30	78.50±2.12	80.20±0.24	c.030
Lt. ROT	Pre	70.33±4.16	55.50±0.70	73.50±2.12	a.040 b.007
	Post	80.00±5.29	67.50±4.94	71.85±5.12	c.234

Data:Mean±SD, Rt. LF;right lateral flexion, Lt. LF;left lateral flexion, Rt. ROT;right rotation, Lt. ROT;left rotation a:time, b:group, c:time×group

3. Changes in Upper trapezisus trigger point according to neck exercise for 2 weeks

There was no interaction effect on the timing and group of measurements at SBG, PBBG, CG on upper trapezius <Table 4>.

Table 4. Changes in Upper trapezius trigger point according to neck exercise for 2 weeks

(Unit : kg)

		SBG (N=5)	BFBG (N=5)	CG (N=5)	P
Rt. URA	Pre	3.70±1.27	5.40±2.68	5.15±3.04	a.130 b.709
	Post	5.40±0.81	6.60±0.28	5.09±8.01	c.443
Lt. URA	Pre	4.56±1.76	4.35±2.33	7.75±4.03	a.236 b.462
	Post	5.56±0.66	5.65±1.90	8.71±1.03	c.658

Data:Mean±SD, Rt. URA;right upper trapezius, Lt. URA;left upper trapezius, a:time, b:group, c:time×group

4. Changes in grip strength according to neck exercise for 2 weeks

There was no interaction effect on the timing and group of measurements at SBG, PBBG, CG on grip strength <Table 6>.

Table 5. Changes in grip strength according to neck exercise for 2 weeks

(Unit : kg)

		SBG (N=5)	BFBG (N=5)	CG (N=5)	P
Rt. Grip	Pre	26.23±2.05	23.35±0.49	46.05±5.44	a.454 b.004
	Post	29.10±3.50	23.85±3.60	42.23±5.44	c.648
Lt. Grip	Pre	26.40±1.34	23.10±0.14	44.95±4.03	a.797 b.001
	Post	25.73±4.03	22.75±4.03	43.34±0.45	c.974

Data:Mean±SD, Rt. Grip;right grip, Lt. Grip;left grip, Rt. a:time, b:group, c:time×group

CONCLUSION

Recently, smartphones are the most frequently used tools in everyday life as they are the advantage of being able to instantly use various contents such as Internet functions and application use in addition to mobile phone functions in the past. Due to convenience, more people are using smartphones excessively, and the more time they spend on smartphones, the more physical abnormalities and pain related to musculoskeletal disorders, and the stronger the symptoms of neck pain become.

In addition, the movement of thoracic vertebrae is limited, causing frequent neck pain along with round shoulder. Therefore, in this study, a combination of neck stabilization and thoracic mobility exercise was conducted.

The two-week myofacial release and deep muscle exercise program will ease the discomfort of cervical , effectively showing the stability of cervical and functional movements, and serve as a basis for cervical-related exercises.

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