

The Effect of Magnetic Field Therapy and Massage on the Tension of the Trapezius Muscle and Postural Imbalance

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자기장 치료와 마사지가 등세모근 근긴장도와 자세 불균형에 미치는 영향

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Abstract

Purpose: This study aimed to evaluate the effects of magnetic field therapy and Graston massage on muscle tension and posture. **Methods:** The interventions were applied twice a week for two weeks to 28 adults. Muscle tone, Craniovertebral Angle (CVA), and Scapular Index were measured using various tools and techniques.

Results: Both therapies were effective in reducing muscle tension and improving posture. However, the Magnetic group significantly improved the Scapular Index and CVA.

Conclusions: These findings provide evidence-based strategies for enhancing musculoskeletal health. Future research should involve more subjects and a longer intervention period.

1. Introduction

Modern society's incorrect postures and stress lead to increased muscle tension, contributing to musculoskeletal disorders and decreased quality of daily life[1]. In particular, increased tension in the upper trapezius muscle adversely affects the craniovertebral angle (CVA) and the Scapular Index, thereby threatening spinal health. Understanding and managing this is essential for maintaining spinal health[2, 3].

Recent studies suggest that magnetic field therapy and massage positively impact muscle relaxation and pain reduction[4, 5]. However, research focusing specifically on the upper trapezius is limited[6]. This study evaluates the specific effects of these two treatment modalities on the muscle tension of the upper trapezius, the CVA, and the Scapular Index to explore their clinical applicability in improving spinal health. Through this, the study aims to develop evidence-based therapeutic strategies for enhancing musculoskeletal health.

2. Subject and methods

2.1 Subject

This study involved 28 adults from S University in Chungcheongnam-do. The subjects were healthy, not on

muscle-tone-affecting medication, and had no metal pins in their bodies due to surgery. Their BMI was less than 30kg/m².

2.2 Study Procedure

Before the experiment, subjects were given a detailed explanation of the experimental methods and procedures. The measurement date was adjusted through consultation with the subjects. The magnetic group received magnetic therapy, and the massage group received a Graston massage. Each session lasted 20 minutes, applied twice a week for two weeks. A hot pack was applied for 10 minutes before each intervention.

The Graston technique was applied for approximately 40 seconds at a 45° angle parallel and perpendicular to the muscle fibers. Subjects received treatment with a circular coil magnetic field device in a prone position on the neck area. The magnetic pulse was run at 20Hz for 5s with a 10s rest, applying 4500 magnetic pulses each.

The muscle-tone of the non-dominant left upper trapezius trigger point was evaluated using a muscle tone tester. The Craniovertebral Angle (CVA) was measured to observe the posture of Forward Head Posture (FHP). The Scapular Index (SI), related to the length of the Pectoralis minor, was used as an

indicator to observe the posture of the hunched back.

2.3 Statistical Analysis

For the data analysis of this study, SPSS for Windows (version 22.0) was used. Normality was tested using a normality test. To identify differences according to the intervention period(before the intervention, after the intervention, and follow-up), a one-way Repeated Measure ANOVA was conducted, and Fisher’s LSD (least significant difference) was used for posthoc analysis. An independent t-test was used for analysis. The statistical significance level was set at $\alpha = .05$.

3 result

The most significant finding of this study was the significant difference in muscle tone observed only in the Magnetic group. This group showed a significant decrease in post and follow-up compared to pre ($p<0.05$).

In Elasticity, the Massage and Magnetic groups showed significant differences. In the post-hoc verification, the Massage group had a significant decrease in post compared to pre, and the Magnetic group had a substantial decrease in follow-up compared to pre ($p<0.05$, Table 2).

In the Craniovertebral Angle (CVA), the Massage and Magnetic groups showed significant differences. In the post-hoc verification, the Massage group substantially increased post and follow-up compared to pre. The Magnetic group had a substantial increase in post compared to pre and a considerable increase in follow-up compared to post ($p<0.05$).

In the Scapular Index, there was a significant difference only in the Magnetic group, with a substantial increase in post compared to pre- and follow-up ($p<0.05$, Table 3).

In the comparison between groups, there was a significant decrease in the follow-up of Elasticity in the Magnetic group compared to the Massage group ($p<0.05$, Table 2).

[Table 1] General characteristics of subjects

Variable	Mean± SD
Age (year)	22.00±2.18
Height (cm)	172.56±4.94
Weight (kg)	75.67±13.94

Mean±SDa

[Table 2] Changes in muscle tone, stiffness, and elasticity of the Upper Trapezius according to the intervention period

Variable	Group	pre	post	Follow-up	F	p
Muscle tone (Hz)	Massage	24.62±1.33	24.30±1.40	24.80±1.30	1.672	0.198
	Magnetic	25.15±0.95 [§]	24.33±1.72 [‡]	24.17±1.65 [‡]	4.961	0.015*
Stiffness(N/m)	Massage	398.85±10.25	396.07±9.06	396.89±13.38	0.385	0.682
	Magnetic	394.89±4.47	391.85±12.94	389.72±15.61	2.510	0.102
Elasticity & Fatigue (Log decrement)	Massage	1.04±0.07	1.02±0.03 [‡]	1.04±0.08	5.082	0.014*
	Magnetic	1.04±0.06 [§]	1.04±0.07	1.00±0.06 [‡]	4.202	0.027*

(Mean±SD), *p<0.05, †Statistically different between groups, ‡Statistically different from pre, § Statistically different from post, || Statistically different from Follow-up.

[Table 3] Changes in Craniovertebral Angle (CVA) and Round Shoulder Angle according to the intervention period

Variable	Group	pre	post	Follow-up	F	p
craniovertebral angle(degree)	Massage	49.66±1.05 [§]	50.66±1.05 [‡]	50.94±0.47 [‡]	19.555	0.000*
	Magnetic	50.30±1.38 [§]	50.73±1.20	51.13±0.91 ^{‡§}	12.712	0.000*
Scapular Index (%)	Massage	92.05±1.80	92.63±3.20	91.20±2.24	1.475	0.251
	Magnetic	90.99±2.52 [§]	92.41±2.87 [‡]	89.96±4.76 [§]	6.225	0.013*

(Mean±SD), *p<0.05, †Statistically different between groups, ‡Statistically different from pre, § Statistically different from post, || Statistically different from Follow-up.

4. conclusion

In conclusion, both the Massage and Magnetic groups effectively improved the Craniovertebral Angle (CVA) and reduced fatigue in the trapezius muscle. However, the Magnetic group was more effective in enhancing the Scapular Index for round shoulder improvement and the CVA indicating forward head posture.

The results of this study can be used as evidence that applying massage and magnetic field therapy can reduce muscle tension and positively affect correct posture. In addition, it can be helpful as primary data on magnetic field therapy.

The limitations of this study are the limited number of subjects and the short intervention period. In future research, studies should be conducted to verify the long-term effects by increasing the number of subjects and the intervention period.

References

- [1] Kim, Eun-Kyung, and Jin Seop Kim. "Correlation between rounded shoulder posture, neck disability indices, and degree of forward head posture." *Journal of physical therapy science* 28.10 (2016): 2929-2932.
- [2] Kocur, Piotr, et al. "Female office workers with moderate neck pain have increased anterior positioning of the cervical spine and stiffness of upper trapezius myofascial tissue in sitting posture." *Pm&r* 11.5 (2019): 476-482.
- [3] Singla, Deepika, and Zubia Veqar. "Association between forward head, rounded shoulders, and increased thoracic kyphosis: a review of the literature." *Journal of chiropractic medicine* 16.3 (2017): 220-229.
- [4] He, Peijue, et al. "The effect of therapeutic physical modalities on pain, function, and quality of life in patients with myofascial pain syndrome: a systematic review." *BMC*

Musculoskeletal Disorders 24.1 (2023): 376.

- [5] Crawford, Cindy, et al. "The impact of massage therapy on function in pain populations—A systematic review and meta-analysis of randomized controlled trials: Part I, patients experiencing pain in the general population." *Pain Medicine* 17.7 (2016): 1353-1375.
- [6] Miake-Lye, Isomi M., et al. "Massage for pain: an evidence map." *The journal of alternative and complementary medicine* 25.5 (2019): 475-502.