

The effect of sustained natural apophyseal glides on headache, duration and cervical function in women with cervicogenic headache

Eui-Ju Shin¹, Byoung-Hee Lee^{2,*}

¹Graduate School of Physical Therapy, Sahmyook University, Seoul, Korea

²Department of Physical Therapy, Sahmyook University, Seoul, Korea

The objective of this study is to investigate the effect of sustained natural apophyseal glides (SNAGs) on pain and headache duration in women with cervicogenic headache. The method of this study is a single blind and randomized controlled trial. Forty patients with headache were divided randomly into the SNAGs group (n=20), and control group (n=20). The expectation of this study was that the SNAGs group, with facilitatory glide, has full range of movement without pain. Sustained end range holds or overpressure can be applied to the physiological movement and subjects in the control group received just light contact to the occipital area for the same amount of time as the SNAGs group, which is three times per week for a period of four weeks. Visual Analogue Scale (VAS), Headache Duration and Neck Disability Index (NDI)

were evaluated by patients before and after the intervention. NDI in the SNAGs group showed significantly greater improvement, compared to the control group, in which only the SNAGs placebo technique was applied. In addition, a significantly greater improvement on the visual analogue scale was also observed in the SNAGs group compared with the control group ($P < 0.05$). In conclusion, the SNAGs technique can help middle aged female patients suffering from cervicogenic headache for relief of cervical pain and headache. It can also be used in physiotherapy on headache.

Keywords: SNAGs, Cervicogenic headache, Headache duration, Cervical function

INTRODUCTION

Headache is a common symptom for most people. According to the statistical data, 90% of the entire population have experienced headache, and 66% of men and 57% of women suffer from headache at least once per year (Boardman et al., 2003). Inconvenient details on patients suffering from neck pain and headache are mounting (Strimpakos, 2011), and an increasing ratio of headache is greater in women than in men (Fon et al., 1980). Patients with chronic headache account for 2-3 percent of the population; these patients suffer from migraine at least eight times in 15 days. Management of patients with preventive treatment is difficult (Manack et al., 2011).

In the grown-up population, 2.5% of people experience head-

ache, and patients with relapsed chronic headache account for 15-20% (Nilsson, 1995). Attack rate increases to 53% after whiplash injury (Lord et al., 1994). Headache with neck pain is the under-stage of a kind of headache related to damage to cervical musculoskeletal structure (Jull et al., 2007). Neck pain generates psychosocial problems by decreasing work efficiency, causing troubles in business. Because of the discomfort in the neck, patients with neck pain cannot exercise properly (Hakkinen et al., 2007). Therapeutic interventions for neck pain make use of positional exercise, strengthening muscles, education, rest, and intensified training of proprioceptive sensibility under the management and instruction of therapists (Hudson and Ryan, 2010). Clinical manual therapies for patients with neck pain are joint mobilization and joint exercise (Cleland et al., 2005). Joint exercise accompanied by mobili-

*Corresponding author: Byoung-Hee Lee
Department of Physical Therapy, Sahmyook University, 815 Hwarang-ro, Nowon-gu, Seoul 139-742, Korea
Tel: +82-2-3399-1634, Fax: +82-2-3399-1639, E-mail: 3679@syu.ac.kr
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zation is a widely used manual therapy for patients with neck pain for relief of musculoskeletal pain. Patients participate in the treatment by actively making moves while therapists continuously make glides in the joint (Mulligan, 2010). Direct joint exercise can be an effective treatment for patients with cervical disabilities (Sandow, 2011).

This study was conducted in order to investigate the effect of the sustained natural apophyseal glides (SNAGs) techniques by applying them to middle-aged women with neck pain and the effect of the techniques on the duration time of neck pain, headache, and cervical function.

MATERIALS AND METHODS

Participants

A total of 40 women between 30-60 yr of age with neck pain who are under treatment in W spine hospital in Seoul agreed to participate in the study. The subjects were selected under the condition of atraumatic, nonspecific neck pain and being prescribed physical therapy. Patients with herniated disc, fracture, neurologic problem, surgical record, and injection therapy record for reduction of pain were excluded. The participants were randomly allocated to the SNAGs group ($n=20$) and the control group ($n=20$). The current study was approved by the Sahmyook University Institutional Review Board (SYUIRB 2013-016). All participants were given an explanation of the objective of the study and its requirements, and all those who participated provided written informed consent.

SNAGs group

This study used the Mulligan SNAGs techniques as a means of relieving pain from headache and neck. First, a manual therapist sat next to a patient. The therapist held the patient with his trunk, and wrapped the patient's head lightly with his arm on the patient's side, and placed the ring finger on the trouble spot right above the small vertebral joint. The therapist placed the thenar eminence of his opposite hand on the ring finger, which was touching the lesion site. On the site, the therapist performed gliding in the upward direction of the front pupil (45 degrees). The hand, which was touching the spinous process, should be relaxed in order not to squeeze too hard. The source of the power of gliding on the joint surface must come from the opposite hand of the patient-contacting hand. Gliding was applied rhythmically (three times per second) and the width of gliding starts from the middle to the end. The therapist kept on gliding the small joint, and made the pa-

tient turn his head to the side of limited mobilization, and pain. When the patient was turning his head, the therapist fixed the head stably with his hand on the spinous process following the treatment spot in order to maintain the SNAGs technique, and remained in the position for at least 10 sec. This treatment was administered 10 times in a row, 20 min total. At the last stage of actively rotating the neck, the patient used his own hand to make a passive rotation (over press). After holding in the position of newly obtained painless range of motion for 2 sec, the glide should be maintained until the neck slowly returns to the original position (Mulligan, 2010). The Mulligan SNAGs techniques were applied to participants in the SNAGs group, with three 20-min sessions per week, for a period of four weeks.

Placebo SNAGs group

A manual therapist who used the placebo effect for headache stood next to a patient. The therapist did not apply any other techniques, but the contacting pressure of the hand, which was touching the dysfunctional joint. The therapist remained in the position for at least 10 sec. This treatment was administered 10 times repeatedly, 20 min per performance. This treatment was administered three times per week, 20 min per performance, a total of 12 times in four weeks.

Outcome measures

The Visual Analog Scale (VAS) was used for assessment of patients' shoulder joint pain and for measurement of the range of pain. The reliability ($r=0.97$) of this assessment tool is confirmed in the study reported by Bijur et al. (2001). This evaluation tool indicates high levels of intra-rater reliability ($r=1.00$) and inter-rater reliability ($r=0.99$) (Wagner et al., 2007).

The patients were instructed to check the duration time of their pain. A stick mark indicated the duration time of their pain. The closer the stick mark was to 0, the lesser the duration time of pain lasted; 0 indicated a state of absent duration time of pain, while 24 indicated that pain lasted all day long (24 h).

Neck disability index, NDI, is a widely used survey for evaluation of neck disability. Evaluation items include pain intensity, personal care, lifting things, reading books, headache, concentration, work, driving, sleeping, and leisure activity. The score is written by the subjects, measured from 0 points to 5 points, 6 points in total. Interpretation of the score is as follows; 0-4 points: none, 5-14 points: mild, 15-24 points: moderate, 25-34 points: severe, 34 or more: complete (Vernon, 2008). Coefficient of intra-class correlation ($r=0.92$) and evaluation method of criterion reli-

ability by internal consistency, Cronbach's alpha coefficient ($\alpha = 0.96$) demonstrates a high degree of reliability (Swanenburg et al., 2014).

Statistical analyses

The SPSS 19.0 program was used for statistical analyses. The Shapiro-Wilk test was used to determine the distribution of the general properties and outcome measures of the subjects. The paired t test was used for comparison of the pretest and posttest results of pain, duration, and neck disability index within each group, and the independent t test was performed for comparison of the two groups before and after training. A *P* value < 0.05 was considered significant.

RESULTS

No evident significant differences in terms of baseline values were observed between the SNAGs and control groups (Table 1).

In the SNAGs group, the average degree of headache was 46.85 mm before treatment, and 19.70 mm after treatment, a statistically significant decrease of 27.15 mm ($P < 0.05$). In the control group, the average degree of headache was 45.75 mm before treatment, and 35.10 mm after treatment, a statistically significant decrease of 10.65 mm. Significant average pre-post differences in the degrees of headache were observed between the groups ($P < 0.05$). In the SNAGs group, the average duration time was 5.25 h before treatment, and 2.05 h after treatment, a statistically significant decrease of 3.20 h ($P < 0.05$). In the control group, the average du-

ration time was 5.10 h before treatment, and 3.95 h after treatment, a statistically significant decrease of 1.15 h ($P < 0.05$). Significant pre-post differences ($P < 0.05$) in duration time were observed between the two groups. In the SNAGs group, neck function was 25.75 points before treatment, 12.80 points after treatment, showing a statistically significant decrease. In the control group, neck function was 26.50 points before treatment, 21.45 points after treatment, showing a statistically significant decrease of 5.05 points. Significant pre-post differences ($P < 0.05$) in neck function were observed between the two groups (Table 2).

DISCUSSION

Following application of SNAGs to 37 patients with cervicogenic headache for six weeks, Reid discovered that VAS of the experimental group was decreased ($P < 0.001$), while change of pain in the control group remained the same. After six weeks of intervention, significant difference ($P = 0.03$) was observed between the two groups, proving SNAGs to be effective for patients with cervicogenic headache. The cause of cervicogenic headache is reported to be hypofunction of the cervical vertebrae. Application of the SNAGs technique for control of pain is interpreted to be effective for improving problems of patients with headache and neck pain. While temporary migraine or tensional headache occurs less than 15 days in one month, chronic headache occurs more than 15 days in the first 3-6 months. In the advanced research aimed at patients with tensional type of headache, decreased headache duration time through manual therapy has been confirmed (Castien et al., 2012). According to this research, after application of manual therapy for eight weeks, pain duration time per day has almost halved in 78% of patients. Pain duration time was less than 8.5 h per day in 58% of 110 patients in the experimental group who were treated with manual therapy. Pain duration time was decreased in 59% of 32 patients in the control group. Most patients with unmanageable chronic migraine complained of headache at least 15 days in one

Table 1. General characteristics of subjects

	SNAGs group (n=20)	control group (n=20)	t (P)
age (yr)	48.20±7.79 ^{a)}	48.05±6.81	0.065 (0.949)
height (cm)	162.95±4.16	161.85±4.39	0.813 (0.421)
weight (kg)	66.70±4.65	64.55±4.89	1.423 (0.163)

^{a)}M±SD. SNAGs, Sustained Natural Apophyseal Glides.

Table 2. Comparison of cervical pain and disability with groups and between groups (n= 40)

Parameters	Values				Change values	
	SNAGs group (n=20)		Control group (n=20)		SNAGs group (n=20)	Control group (n=20)
	Pre	Post	Pre	Post	Post-Pre	Post-Pre
VAS (mm)	46.85±9.79 ^{a)}	19.70±6.14*	45.75±11.41	35.10±13.19*	27.15±14.66 [†]	10.65±8.25
HD (h)	5.25±1.21	2.05±2.41*	5.10±1.29	3.95±1.09*	3.20±1.39 [†]	1.15±0.93
NDI (score)	25.75±5.49	12.95±5.51*	26.50±6.66	21.45±7.36*	12.80±5.96 [†]	5.05±4.91

^{a)}M±SD. * $P < 0.05$ from pretest. [†] $P < 0.05$ from post-pre between the two groups. SNAGs, Sustained Natural Apophyseal Glides; VAS, Visual Analogue Scale; HD, Headache Duration; NDI, Neck Disability Index.

month. This specific problem affects 2-3% of the entire population. These days, effective management of those people is not achieved by common means of preventive treatment (Manack, 2011; Olesen, 2006). Jull et al. (2002) conducted an experiment of cervicogenic patients who were divided into three groups, an experimental group managed with manual therapy, an experimental group managed with exercise treatment, and an experimental group managed with both manual therapy and exercise treatment. Significant decreases in the degree of headache and pain duration time were observed in the experimental group managed with both manual therapy and exercise treatment.

The result of this study was achieved by application of the SNAGs technique and practice of the SNAGs placebo effect in patients with neck pain for four weeks. In 20 patients in the experimental group, pain duration time was 5.25 h before treatment, and 2.05 h after treatment, a significant decrease of 3.20 h ($P < 0.05$). In 20 patients in the control group, pain duration time was 5.10 h before treatment, and 3.95 after treatment, a significant decrease of 1.15 h ($P < 0.05$). In this study, application of the SNAGs technique to patients with neck pain was confirmed to be effective in reducing the pain duration time. Therefore, application of the SNAGs technique on the pain generating segmentum can be considered effective in reducing pain duration time in a positive way.

Jorritsma et al. (2012) measured neck disability of 112 patients with lesions in the cervical vertebrae using the Neck Disability Index (NDI). The average NDI was 21.5 points, and standard deviation was 7.4 points. On the other hand, this study measured neck disability of 40 patients with neck pain. In the experimental group, the average NDI was 25.75 points before treatment, and 12.95 after treatment, showing a significant decrease ($P < 0.05$). In the control group, the average NDI was 26.50 before treatment, and 21.45 after treatment, showing a significant decrease ($P < 0.05$).

Neck pain has a negative effect on daily life and work performance (Vernon and Mior, 1991), which can lead to cervical dysfunction. In this study, as a result of application of the Mulligan SNAGs technique to middle-aged women with neck pain, duration times of headache, and migraine were reduced, and cervical function was considered to be improved. Given that the facet joint of the cervical vertebrae has a semicircular structure, the SNAGs technique was applied to the end of the joint's range of motion, and a certain power and direction was maintained until the joint returned to the original position (Mulligan, 2010). Application of the SNAGs technique to middle-aged women with neck pain is

considered effective in reducing the duration time of headache, and neck pain, as well as in development of neck function. This study was aimed at proposing appropriate guidelines for application in further clinical practice, and providing a base line data to be put to use.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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