# Effect of Manual Therapy and Stretching Exercise on using Pain Scale (VAS) in Dental Students with Neck Pain: a Single Blinded Randomized Control Trial (RCT)

# ผลของการรักษาด้วยหัตถบำบัดและการยืดเหยียดกล้ามเนื้อต่อระดับความเจ็บปวดในนักศึกษาทันตแพทย์ที่มีอาการปวดคอ (a single blinded randomized control trial (RCT))

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**ABSTRACT**

Neck pain is a major musculoskeletal disorder (MSDs) among dentists. It begins in their clinical practice as dental students. The objective of this study was to determine the effects of manual therapy and stretching exercises on by using the pain scale (VAS) in dental students with neck pain. Ten participants were in the control group and ten participants were in the treatment group. Both groups received manual therapy twice a week for 2 weeks. Additionally, the treatment group received active stretching daily exercises at home and a booklet with instructions on how to do the exercises. The results show the VAS among participants was not significantly different between groups but was significantly different within groups ($p< 0.05$). In the future, we should find out the specific treatment and exercise to improve neck pain in the dental students.

**บทคัดย่อ**

อาการปวดคอเป็นปัญหาที่พบได้มากในทันตแพทย์ มักเริ่มมีอาการตั้งแต่ขณะให้การรักษาทางคลินิกแก่ผู้ป่วยขณะเป็นนักศึกษา วัตถุประสงค์ของการศึกษานี้คือเพื่อศึกษาผลของการรักษาด้วยหัตถบำบัดและการยืดเหยียดกล้ามเนื้อต่อระดับความเจ็บปวดในนักศึกษาทันตแพทย์ที่มีอาการปวดคอ นักศึกษาทันตแพทย์ที่มีอาการปวดคอทั้งสองกลุ่มจำนวน 20 คน จะได้รับการรักษาด้วยหัตบำบัด 2 ครั้งต่อสัปดาห์เป็นระยะเวลา 2 สัปดาห์ ร่วมกับกลุ่มรักษาได้รับคู่มือการยืดเหยียดกล้ามเนื้อเพื่อทำการยืดเหยียดกล้ามเนื้อด้วยตนเองที่บ้านเป็นระยะเวลา 2 สัปดาห์ ผลการศึกษาพบว่าทั้งสองกลุ่มไม่มีความแตกต่างกันในเรื่องระดับความเจ็บปวดภายหลังที่ได้รับการรักษาทันทีและที่เวลา 2 สัปดาห์แต่ภายในกลุ่มพบว่ามีความแตกต่างกันอย่างมีนัยสำคัญทางสถิติ ($p < .05$) การรักษาด้วยหัตถบำบัดและการยืดเหยียดกล้ามเนื้ออาจช่วยลดระดับความเจ็บปวดในนักศึกษาทันตแพทย์ที่มีอาการปวดคอ ในอนาคตอาจต้องมีการออกแบบการรักษาที่มีรูปแบบเฉพาะเพื่อช่วยลดปัญหาเรื่องอาการปวดคอในนักศึกษาทันตแพทย์

**Key Words**: Pain scale (VAS), Neck pain, Manual therapy, Stretching exercises
**คำสำคัญ:** ระดับความปวด (VAS) อาการปวดคอ หัตถบำบัด การยืดเหยียดกล้ามเนื้อ

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**Introduction**

Neck region is the most common location of pain symptoms, reported in about forty-eight percent of dental students (Harutunian et al., 2011, Morse et al., 2007, Thorntona et al., 2008). The impacts of Musculoskeletal disease (MSDs) can lead to sick leave, decreased quality of life (QOL) such as discomfort while working, and a significant negative effect on their overall health (Puriene et al., 2008, Valachi, Valachi, 2003). Development of neck pain in dentists may be related to the higher levels of cervical spine loading from the sustained non-neural spinal postures during dental work such as awkward head posture and slump sitting or flexed posture (Caneiro et al., 2010, Schuldt et al., 1986.

As mentioned above, the causes of musculoskeletal pain in dentists are repetitive movements and prolonged poor dental working posture, which can lead to muscle damage, as well as ligament and joint injuries (Hayes et al., 2008, Marklin, Cherney, 2005, Valachi et al., 2003). Dental working posture is a biomechanics risk factor (Caneiro et al., 2010, Nutalapati et al., 2010). Since dental students have a limited time to perform and finish their work, they are often careless about their posture (Carvalho et al., 2009, Thorntona et al., 2008). As a result, the dental student's working posture can generate physiological alteration problems or musculoskeletal disorders which can cause neck pain (Harutunian et al., 2011, Thorntona et al., 2008).

For all these reasons, it is necessary to find specific treatment to improve muscle pain in dental students with neck pain, such as manual therapy, which is one of the standard physical treatments. The results of this study may determine primary information about MSD problems in dental students and identify the most effective specific treatment to improve these problems. The purpose of the study is to determine the effectiveness of manual therapy and stretching exercise for improving neck pain in dental students.

**Materials and methods**

This study was approved by the Khon Kaen University ethics committee for human research based on the declaration of Helsinki and the ICH good clinical practice guidelines. This was a single blind randomized control trial (RCT) that was carried out at the Orofacial Pain Clinic at the Faculty of Dentistry, Khon Kaen University, Khon Kaen, Thailand. All participants with mechanical neck pain were included in this study on the basis of their questionnaire response, medical history, and a study-related clinical examination of the cervical spine which was carried out by an experienced physical therapist.

The screening test was done by one physical therapist following the standard procedure of cervical examination. The assessor then classified this information into Grade I or Grade II (caused by muscle tightness or joint restriction) with The Neck Pain Task Force criteria. Participants were more than 18 years old. Their pain intensity was moderate on visual analog scale (VAS) and had a duration of 3 months or longer. All participants were diagnosed to have neck pain without radiating pain, numbness, or parathesia over the upper limbs. Participants were excluded if they had experienced, or were experiencing, one or more of the following:

history of spinal surgery, traumatic or fracture history in the spinal or pelvic region and shoulder region, any congenital spinal deformities such as idiopathic scoliosis, systemic diseases that affected the structure of spine such as cancer, rheumatoid arthritis or systemic lupus erythematosus, any hearing impairment requiring the use of a hearing aid, and any visual impairment not corrected by glasses. Then, the physical therapist randomly drew lots to assign the participants to a group

They were asked to sign a consent form. Twentyt participants were randomized into 2 groups using simple random sampling (SRS) The control group had 10 participants with mean age 22.5 ± 0.52 and the treatment group (n=10) with mean age 22.80 ± 0.79. The participants were assessed at the baseline assessment, 48 hrs follow-up and 2 week follow up by 1st assessor. Baseline variables included demographic data and self-reported measures for pain intensity.

**Musculoskeletal pain symptoms**

The regions of the musculoskeletal problems will be defined according to the questionnaire such as musculoskeletal pain symptoms in the neck region. Intensity of pain will be rated on a 10-point ordinal scale (VAS score). It consists of 10 points from 0 to 10 with 0 being "no pain" and 10 being "the worst pain it could be".

For the intervention protocol, the physical therapist had been treating patients with manual therapy for over 5 years . She was not informed about the participants' group. Participants in the control group received manual therapy twice a week, for 2 weeks. Manual therapy consisted of 2 components, the cervical mobilization techniques or articular release techniques and myofascial release technique. Participants in the treatment group received manual therapy twice a week for 2 weeks and performed active stretching daily exercises at home following the schedule in the booklet that they received.

**Results and discussion**

Ten participants (1 males and 9 female) were in the control group and 10 participants (6 male and 4 female) were in the treatment group. Characteristics of the subjects are shown in Table 1 for means and standard deviations. Baseline comparability was assessed using the Student's t test for continuous variables and Chi-square test. Results of the clinical characteristics of the participants demonstrated that there were no significant differences in age, BMI, reading duration, computer using duration, and number of patients treated.

**Table1** Clinical characteristics of the participants (n = 20)

| | **Control group (n = 10)** | **Treatment group (n = 10)** | **p value of differences between groups** |
|---|---|---|---|
| | **Mean ± standard deviation (SD)** | **Mean ± standard deviation (SD)** | |
| Age (years) | 22.5± 0.52 (22-23) | 22.8± 0.79 (22-23) | 0.33 |
| Gender (male/female) | 1/9 | 6/4 | 0.18 |
| Disease duration (months) | 12.4 ± 10.31 (3-36) | 15.9 ± 14.36 (3-48) | 0.54 |
| BMI ($Kg/m^2$) | 20.84± 3.84 (17.19-26.81) | 20.04 ± 1.88 (17.73-22.66) | 0.44 |
| Reading duration (hrs) | 1.8 ± 1.55 (1 -6) | 1.95 ± 1.3 (0.5-4) | 0.82 |
| Computer using duration (hrs) | 3.6± 1.5 (1-6) | 3.8± 1.32 (2-6) | 0.76 |
| Number of patients treated | 1.80 ± 0.42 (1-2) | 1.9 ±0.32 (1-3) | 0.56 |

Continuous variable: mean value standard deviation

*Statistically significant difference between groups at p<0.05

Figure 1 and table 2 show the VAS of both groups before and after treatments. Data was analyzed by a student t-test by mean difference from baseline in each group. The data were not significant differed between groups at baseline. Data was analyzed by a Repeated measure ANOVA by mean difference from baseline at differed followed-up time in each group. The VAS score within the treatment group differed significantly at immediately effect, 48 hrs follow-up (p = 0.002, 0.003respectively). The VAS scores within the control group showed differed significantly at only immediately effect follow-up (p=.01). Analysis also revealed no significant difference between the treatment and control groups at the 2 week post-test measurements.

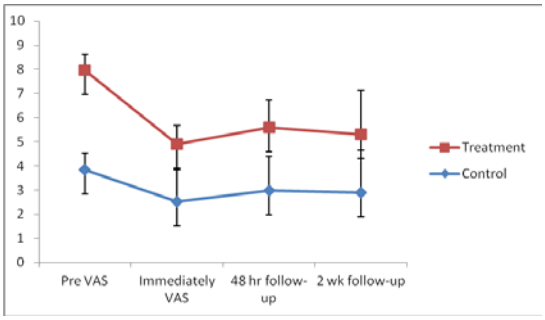


**Figure1** VAS score in both groups at differed followed-up time

**Table 2** VAS score in both groups at differed followed-up time

| | Control group (n = 10) Mean ± standard deviation (SD) | Treatment group (n = 10) Mean± standard deviation (SD) | p value of differences between groups |
|---|---|---|---|
| Pre VAS | 3.83±0.70 | 4.31±0.67 | 0.34 |
| Immediately VAS | 2.53±1.30 | 2.38±0.77 | 0.76 |
| 48 hrs VAS | 2.99±1.40 | 2.59±1.16 | 0.50 |
| 2 wk VAS | 2.89±1.74 | 2.41±1.84 | 0.56 |

Continuous variable: mean value standard deviation

*Statistically significant difference between groups at p<0.05

Physiotherapy treatment programs provide pain relief, and reduce or reverse specific impairments. Mechanisms of action of physical therapy treatment can increase local input spinal inhibitory circuits or descending supraspinal inhabitation. These mechanisms will reduce nociceptor input and sensitization of dorsal horn and decreasing input to higher centers and lessening pain. Manual therapy techniques produce effects both peripherally and centrally (Bialosky et al., 2009, Sluka, 2009, Strong et al., 2002, Wells et al., 1994). Manual therapy techniques stimulate the mechanoreceptors located within skin fascia, muscle, tendons, ligaments, and joint capsule, that can induce an alteration in the bias of sensory input from these structures. It is possible to induce the periphery inhibition by the gate control theory. Exercise is frequency used in the rehabilitation setting as part of a pain management program (Sluka, 2009). Exercise is beneficial for a variety of pain conditions including chronic neck pain, conversely it is not beneficial in acute pain.

Additionally, the manual therapy influenced on reducing muscle and soft tissue tightness, improving healing by increasing blood flow to the area, that may promote clearance of toxic substances.

The results were similar to those in previous studies they found that patients with neck pain could use a specific exercise program improve their ability to maintain a neutral cervical posture during prolonged sitting (Falla et al., 2007). More beneficial for pain relief and increased range of motion (ROM) in patients with neck pain for short and long time periods were a combination of manual therapy and exercise rather than medication treatment, manual therapy and and/or exercise alone (Walker et al., 2008). Nevertheless, this result demonstrated that VAS scores were not significantly different between groups but differed in the treatment group at all follow-up time periods. A weak point of our study is the reasonably??? short follow up time (2 weeks). Stretching exercise, light exercises for muscles, clay and massage treatments 3 times a week over 5 weeks can significantly reduce the occurrence of chronic neck pain (Levoska, Keinen-Kiukaanniemi, 1993). The study of Ylinen et al. found that at a 12 months follow-up, there was a significant reduction in neck pain as a result of stretching exercise performed on average twice weekly (Ylinen et al., 2007). In this study, pain scale in the treatment??? is tendency to reducing, it may refer to improve??? of severity in neck pain. Therefore, the longer period of follow up is needed to confirm the result of our study.

**Conclusions**

The manual therapy and stretching exercises help decrease the pain scale and may provide a solution for MSDs in dental students with neck pain.

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