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MUSCLE ENERGY TECHNIQUES FOR CERVICAL SPONDYLOSIS IN THE ELDERLY: A CASE REPORT

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ABSTRACT

Background: Spondylosis is a progressive degenerative disease that commonly occurs in the spine in both the cervical and lumbar segments. In the treatment of cervical Spondylosis, manual therapy can also be given to patients to reduce pain, increase the scope of joint motion, and improve functional abilities in the elderly to improve quality of life**.** This study focuses on the effects of MET on cervical Spondylosis in the elderly. **Method:** The research method used is case study research on the elderly with cervical Spondylosis conditions. The patient complained of pain and stiffness in the right and left neck. Pain in the neck to the right and left shoulder has been experienced by the patient for 2 years ago and is exacerbated when lifting heavy objects. Patients were given an intervention in the form of Muscle Energy techniques with Post Isometric Relaxation techniques with a combination of ultrasound and transcutaneous electrical nerve stimulation for 6 treatments within one month. **Result:** After one month with six physiotherapy sessions, namely MET and a combination of eletrotherapy resulted in increased cervical ROM, decreased pain and improved quality of life. However, the results obtained are not optimal because it requires several more intervention sessions. **Conclusion:** The implementation of conventional therapy and MET with post isometric relaxation technique can reduce pain, increase the cervical range of motion, and increase functional abilities in the elderly with cervical spondylosis.

Keywords: Muscle energy techniques, cervical, Spondylosis, physiotherapy

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INTRODUCTION

The aging process is a universal phenomenon that occurs at a gradual pace due to the natural decline of the body's metabolic system[1]. The aging process generally coincides with the degenerative process, which is a process of deterioration in the function of nerve cells and tissues that is progressive in nature resulting in degenerative diseases and has no known cause[2]. The primary factor associated with degenerative diseases is sedentary lifestyle. Degenerative diseases are usually experienced by the elderly. The elderly tend to be at risk of various diseases, especially degenerative diseases when compared to younger ages[2].Degenerative diseases in the elderly lead to decreased organ function such as difficulty sleeping, shaking, and decreased function of certain organs[3].

Degenerative diseases which are commonly experienced by the elderly usually affect the bones and joints often such as osteoarthritis, arthritis and Spondylosis and osteoporosis[4]. The elderly tend to feel pain in joints such as knee joints, shoulder joints, waist joints and finger joints that cause limitations in the scope of joint motion, decreased muscle strength resulting in decreased productivity and quality of life of the elderly[3].For example, one of the joints that is often degenerative is the facet joint in the spine, namely spondylosis[5].

Spondylosis is a progressive degenerative disease that commonly occurs in the spine in both the cervical and lumbar segments. Spondylosis is the most common cause of myelopathy or nervous system disorders affecting the spinal cord both cervical and lumbar[6].

In the elderly with cervical spondylosis, the clinical presentations are pain in the neck muscles to the shoulder, both localized pain and radiating to the forearm, limitation of the scope of joint motion in the neck and functional disorders that lead to a decrease in the quality of life of the elderly. Therefore, Spondylosis patients need to get the right and correct medical services. One of the health services that can be provided to Spondylosis patients is physiotherapy services[7].

Physiotherapy management provided by physiotherapists can be in the form of electrophysical modality equipment to reduce pain[8]. In the treatment of cervical Spondylosis, manual therapy can also be given to patients to reduce pain, increase the scope of joint motion, and improve functional abilities in the elderly so as to improve quality of life[9]. The type of manual therapy that can be given to the elderly who experience cervical Spondylosis with cervical motion disorders and pain is muscle energy techniques (MET)[10].

Muscle energy techniques (METs) have been known to help with musculoskeletal disorders[11]. The concept of Muscle Energy Techniques (MET) is one of the manual therapy interventions that focuses on soft tissues such as muscles and tendons derived from osteopath professional manipulation techniques with a combination of direction and motion control by the patient with isometric and or isotonic muscle contractions to improve muscle function and reduce pain[12].

This study focuses on the effects of MET on cervical Spondylosis in the elderly. The cervical Spondylosis condition in this case report is unique as it is accompanied by cervical disc

bulging. Likewise, MET is still rarely used in specific cases such as cervical spondylosis.

METHOD

The research method used is case study research on the elderly with cervical spondylosis conditions. The research was conducted at one of the hospitals in the Salemba area, Central Jakarta, Indonesia from February to March 2022. Patients were explained about the research and given inform-consent regarding the patient's willingness in this study. Interviews, examinations, interventions, and evaluation of physiotherapy actions on patients, carried out by physiotherapists as researchers. The study was conducted for about 1 month with a total of six therapy sessions.

Patient characteristics: The elderly patient was a 70-year-old female (height: 154 cm, weight: 55.5 kg, BMI: 23.4 kg/m^2). The patient complained of pain and stiffness in the right and left neck. Pain in the neck to the right and left shoulder has been experienced by the patient for 2 years ago and is exacerbated when lifting heavy objects. On February 16, 2022, the patient went to the hospital for an examination by a doctor because the pain in the neck did not decrease. After the examination, the results showed that there was a narrowing of the C4-C5 intervertebral disc. Then, the patient was referred to physiotherapy.

Physical Examination

Pain Assessment: Pain assessment using Visual Analogue Scale (VAS) [13]. Pain assessment with Visual Analogue Scale (VAS) is performed with the aim of identifying the level of pain experienced by the patient. VAS examination results are generally expressed in millimetres. In the examination results, movement pain was found in the cervical active basic movement function assessment which was accompanied by an assessment of the range of motion of the joints.

Special Test: A special test in the condition of cervical Spondylosis is the Spurling test, which is a provocation test to determine the presence of pain in the cervical part due to pressure on the radicle[14]. The physiotherapist moves the patient's neck in the direction of rotation and neck extension on each side, thereby closing the ipsilateral neuroforamen in the direction of rotation and causing pain due to radiculopathy. The result of the test was positive.

Functional Assessment: Functional assessment with Neck Disability index to assess the functional ability of patients with cervical Spondylosis[15]. Functional assessment using NDI (Neck Disability Index) by examining the patient is asked to fill in answering every question given by the physiotherapist which is divided into 8 question items, including pain intensity, self-care, heavy lifting, work, headache, concentration, sleep, and reading.

Each item consists of 5 assessment points. The result or interpretation of the score is converted into 0-100, value 0 represents minimal no disability and value 100 represents complete disability [16]. The functional assessment of the patient obtained an NDI score of 52.5% (severe disability).

The following table presents the results of the examination of the patient

Parameters		Examination Results
Cervical active movement pain (VAS)		
	Flexion	37 mm
	Extension	20 mm
	Left side bend	20 mm
	Right side bend	20 mm
	Left rotation	24 mm
	Right rotation	24 mm
Cervical Range of Motion (ROM)		
	Flexion	0 - 37°
	Extension	0 - 40°
	Left side bend	0 - 43°
	Right side bend	0 - 40°
	Left rotation	0 - 50°
	Right rotation	0 - 47°
Neck Disability Index		52.5 %

Table 1. Examination Results

Interventions

The intervention provided is divided into two stages, which are the conventional modalities and Muscle Energy Techniques (MET). The following is an overview of each intervention.

Conventional modalities

In cases of cervical Spondylosis, physiotherapy intervention recommendations depend on the symptoms of the expansion of the problem experienced. Both radiculopathy and myelopathy Spondylosis generally use electro therapy modalities to control pain and increase connective tissue extensibility.

Modalities used usually include ultrasound (US), electrical stimulation (TENS), and thermal therapy[8,14]. Ultrasound is an electro physical agent that uses mechanical energy through the conversion of ultra sound waves that produce mechanical vibrations with a frequency between 1 MHz to 3 MHz so that it will produce thermal and non-thermal energy in the form of cavitation, acoustic streaming and micro massage so that there is an increase in local blood circulation which aims to help repair damaged tissue[17].

Micro massage will also block nociceptors due to the activation of mechano-receptors on the skin due to the sedative and analgesic effects on afferent nerves II and III[18]. The ultrasound was dosed according to the frequency of 1 MHz for deep tissue and 3 MHz for superficial tissue. Then, the ultrasound intensity is given at 0.1-1.5 watt/cm^2. For the duration of ultrasound use, the time dose is: 1 minute x (effective radiating area): Area) x (number of pulse ratio)[17].

For the determining type of ultrasound therapy, acute and subacute conditions use

intermittent type with a certain pulse ratio. Whereas continuous type for chronic conditions [19].With the above reference, the provision of therapy in the patient's condition is using 1 MHz. The patient's condition is chronic so the intensity of 0.8 Watt/cm^2 with continuous type, and time for 7 minutes was chosen. Ultrasound intervention is given before the application of Transcutaneous Electrical Nerve Stimulation (TENS).

Transcutaneous electrical nerve stimulation (TENS) is commonly used for pain reduction at the nerve level in patients. Transcutaneous electrical nerve stimulation (TENS) is a non-pharmacological treatment method to reduce acute and chronic pain. TENS can reduce pain by interrupting pain transmission at the spinal cord level and blocking pain transmission to the brain (gate control theory) with parameters between 75 - 150 Hz (pulse per second).[20]. TENS intervention was performed twice a week with an intensity of 70 mA for 15 minutes. The use of TENS was performed after ultrasound administration and before the application of MET.

Muscle Energy Techniques (MET)

Muscle energy techniques (MET) is one of the manual therapy techniques known to improve movement, pain reduction in musculoskeletal conditions[12]. The application of MET has quite a lot of influence and function when you want to provide interventions with the aim of normalizing soft tissue structures such as shortening or muscle tension without directly involving the joints around the muscles. The MET method also has the effect of increasing joint mobility by affecting the elasticity of soft tissues that occur stiffness as a factor in limited joint mobility limitations[21].The use of MET focuses on stimulating isometric muscle contractions and stretching to increase ROM and reduce pain so the technique will be more on the surrounding soft tissue, rather than directly on the affected joint. The specific use of MET consists of several techniques [9]. One that can be used primarily for pain reduction and ROM improvement is post isometric relaxation (PIR)[12,22]. In clinical application, the type of MET with PIR is similar to the use of hold relax techniques[14,23]. Details of MET exercises are given in the following table.

Patient Position: Sitting upright **Frequency: 2 times/week** **Time: 20-30 minutes, Type: Post isometric relaxation (PIR), Repetition: 8 times per movement, (10 second hold 10 second rest per movement), Sets: 3 set per technique**	
Techniques	Procedures
PIR extension technique	The patient is in a sitting position. The neck is positioned in limited motion in the extension direction. Then the physiotherapist's palm is on the back to provide resistance towards flexion in that position. Then the patient resists the pressure from the physiotherapist.
PIR flexion technique	The patient is in a sitting position. The neck is positioned in a restricted movement of flexion. The patient resists flexion from pressure by the physiotherapist's palm on the front of the head.
PIR rotation technique	The patient is in a sitting position. The physiotherapist's palms

	are on the temporal and lateral temples. Then, ask the patient to rotate the head to a painful and restricted position. With resistance given by the physiotherapist in the direction of rotation, the patient resists the push from the physiotherapist in the opposite direction of rotation. The technique is also applied to the opposite rotational movement.
PIR side bending technique	The patient is in a sitting position, the physiotherapist's palms are on the temporal and above the patient's ears. Position the neck in limited and painful side bending motion. Physiotherapy applies pressure in the opposite side bending direction. Then, the patient resists the side bending motion of the physiotherapist. Then, continue with the movement on the opposite side.

Table 2. Muscle Energy Techniques Procedures

RESULTS AND DISCUSSION

After the intervention, the patient felt a change in pain conditions and improved functional abilities. These conditions are presented in table 3.

Assessment parameter for Cervical Movement		**Evaluation periods**	
		Before	**After 6 times intervention**
Pain (VAS)			
	Flexion	37 mm	20 mm
	Extension	20 mm	10 mm
	Left side bend	20 mm	10 mm
	Right side bend	20 mm	0 mm
	Left rotation	24 mm	10mm
	Right rotation	24 mm	10mm
Range of motion (ROM)			
	Flexion	0 - 37°	0 - 40°
	Extension	0 - 40°	0 - 50°
	Left side bend	0 - 43°	0 - 50°
	Right side bend	0 - 40°	0 - 50°
	Left rotation	0 - 50°	0 - 50°
	Right rotation	0 - 47°	0 - 50°
Neck Disability Index		52.5 %	20 %

Tabel 1. Evaluation results

Based on the table above, there is a reduction in motion pain in cervical flexion, extension, side bend movements. In addition, there is also an increase in the active cervical range of motion in cervical flexion, extension, side bend and right rotation, but there is no increase in the range of motion in cervical sinistral rotation movements. In the functional ability of the neck there is an increase in cervical functional ability on the neck disability index (NDI) score. However, the results obtained are not that significant.

The results of changes in movement pain in the results of this study are supported by research by Abdel-Aziem et al (2014) which states that the combination of TENS and ultrasound can reduce functional limitations, and disability due to cervical spondylosis[24]. In the previous study, intervention in the form of ultrasound combined with TENS, superficial heat, and exercise interventions had the effect of reducing pain, reducing disability due to cervical Spondylosis in all subjects in the study. Thermal and non-thermal energy in the form of cavitation, acoustic streaming and micro massage produced by ultrasound vibrations cause an increase in local blood circulation which aims to help accelerate the process of repair or regeneration of damaged tissue resulting in a prolonged reduction in pain25.

Then, MET, which is included in manual therapy, also plays a role in reducing pain because it can train muscles in the cervical and improve coordination of superficial cervical muscles which leads to reduced pain, increased cervical joint range of motion and functional ability and prevent further injury 26. Muscle energy techniques can be said to be one of the interventions in exercise therapy that is similar to hold-relax exercise[22,23]. The MET treatment also provides information to the mechanoreceptors which in turn diverts the nociceptors, so that pain is reduced and the scope of joint motion increases[27]. Reduced pain will affect the mobility of the patient's neck joint or in this way, when pain decreases; there will be an increase in the scope of joint motion and functional ability of the neck which leads to increased daily activities in patients[28]. Thus, MET can provide a decrease in disability experienced by patients with neck pain[21]. This is in line with the results of this study, with reduced disability by patients.

In this study, the case presented was quite complex with the condition of cervical Spondylosis, disc compression and elderly patients. The decrease in pain, increase in ROM and decrease in disability have not been seen significantly due to these complex conditions. Thus, further interventions can be provided to improve the patient's condition. The MET intervention and electrotherapy combination were only given six times due to time limitation when taking data and patients who did not complete their physiotherapy sessions in a well-attended manner.

In addition; this study is only a case study, so the use of the results of this study should be used with caution. Different results may occur in different individuals. The MET intervention provided in this study was also combined with electrotherapy modalities, so the effect may be the result of a combination of interventions, not just the MET technique alone. Nevertheless, the MET Technique in the study can be considered more dominant because generally electrotherapy is only a preliminary intervention.

CONCLUSION

From the results of this case report research, it can be concluded that, the implementation of conventional therapy and MET with PIR technique can reduce pain, increase the cervical range of motion, and increase functional abilities in the elderly with cervical Spondylosis.

Ethical Clearence: This research was approved by the Universitas Kristen Indonesia with reference number 0313/UKI.F8.D/ HKP.03.01/2022.

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REFERENCE

1. Santoso TB, Rohmah ASN. Gangguan gerak dan fungsi kognitif pada wanita lanjut usia. J kesehatan, ISSN. 2011; 4(1):41-57.
2. Ariyanti R, Preharsini IA, Sipolio BW. Edukasi Kesehatan Dalam Upaya Pencegahan dan Pengendalian Penyakit Hipertensi Pada Lansia. To Maega J Pengabdi Masy. 2020; 3(2):74.
3. Suiraoka I. Penyakit Degeneratif: Mengenal, Mencegah Dan Mengurangi Faktor Resiko 9 Penyakit Degenaratif.; 2012.
4. Budhyanti W, Anggiat L, Juwita CP. Managing Arthritis Joint Pain and Hypertension in Elderly with Health Education Video. INSPIREE Indones Sport Innov Rev. 2021; 2(2):128-137.
5. Galbusera F, Van Rijsbergen M, Ito K, Huyghe JM, Brayda-Bruno M, Wilke HJ. Ageing and degenerative changes of the inter-vertebral disc and their impact on spinal flexibility. Eur Spine J. 2014; 23:324-332.
6. McCormick JR, Sama AJ, Schiller NC, Butler AJ, Donnally CJ. Cervical Spondylosis myelopathy: a guide to diagnosis and management. J Am Board Fam Med. 2020; 33(2):303-313.
7. Luyao H, Xiaoxiao Y, Tianxiao F, Yuandong L, Wang P. Management of cervical spondylotic radiculopathy: a systematic review. Glob Spine J. 2022; 12(8):1912-1924.
8. Kroeling P, Gross A, Graham N, et al. Electrotherapy for neck pain. Cochrane Database Syst Rev. 2013; 2013(8).
9. Fryer G. Muscle energy technique: An evidence-informed approach. Int J Osteopath Med. 2011;14(1):3-9. doi:10.1016/j.ijosm.2010.04.004
10. Schenk R, Adelman K, Rousselle J. The effects of muscle energy technique on cervical range of motion. J Man Manip Ther. 1994; 2(4):149-155.
11. Sbardella S, La Russa C, Bernetti A, et al. Muscle energy technique in the rehabilitative treatment for acute and chronic non-specific neck pain: A systematic review. Healthc. 2021;9(6).
12. Chaitow L, Crenshaw K. Muscle Energy Techniques. Elsevier Health Sciences; 2006.
13. Sephton R, Hough E, Roberts SA, Oldham J. Evaluation of a primary care musculos keletal clinical assessment service: A preliminary study. Physiotherapy. 2010; 96(4):296-302.
14. Dutton M. Dutton's Orthopaedic Examination, Evaluation, and Intervention. Fifth Edit. Mc Graw-Hill Educatio; 2020.

15. Young IA, Dunning J, Butts R, Mourad F, Cleland JA. Reliability, construct validity, and responsiveness of the neck disability index and numeric pain rating scale in patients with mechanical neck pain without upper extremity symptoms. Physiother Theory Pract. 2019; 35(12): 1328-1335.
16. Mac Dermid JC, Walton DM, Avery S, et al. Measurement properties of the neck disability index: a systematic review. J Orthop Sport Phys Ther. 2009; 39(5):400-417.
17. Watson T. Ultrasound Dose. Electro therapy. Published online 2015:1-2. Electrotherapy .org
18. Belanger AY. Therapeutic Electrophysical Agents. Lippincott Williams & Wilkins; 2015.
19. Watson T. Current concepts in electrotherapy. Haemophilia. 2002; 8(3): 413-418.
20. Zhu Y, Feng Y, Peng L. Effect of transcutaneous electrical nerve stimulation for pain control after total knee arthroplasty: A systematic review and meta-analysis. J Rehabil Med. 2017; 49(9):700-704.
21. Ojoawo AO, Ige B, Kunnuji K. Muscle energy technique and static stretching in patients with mechanical neck pain - a randomized study. Eur J Clin Exp Med. 2022; 20(1):63-69.
22. Chaitow L. MET variations: possible neurological mechanisms. Ed VOD Leon Chaitow, MET Var. Published online 2013:63-66.http://www.leonchaitow.com
23. Kisner C, Colby LA, Borstad J. Therapeutic Exercise: Foundations and Techniques. Fa Davis; 2017.
24. Abdel-Aziem AA, Draz AH, Battecha KH, Mosaad DM. Effect of ultrasound combined with conventional therapy on neck pain, function, and disability in patients with cervical spondylosis: A randomized placebo-controlled trial. J Musculoskelet Pain. 2014; 22(2):199-205.
25. Behrens BJ, Beinert H. Physical Agents Theory and Practice. Third Edit. F. A. Davis Company; 2014.
26. Thomas E, Cavallaro AR, Mani D, Bianco A, Palma A. The efficacy of muscle energy techniques in symptomatic and asymptomatic subjects: A systematic review. Chiropr Man Ther. 2019;27(1).
27. Bove GM, Delany, Sean P, Hobson L, et al. Manual therapy prevents onset of nociceptor activity, sensorimotor dysfunction, and neural fibrosis induced by a volitional repetitive task. Pain. 2019; 160(3):139-148.
28. Chen Q, Wang Z, Zhang S. Exploring the latest advancements in physical therapy techniques for treating cervical spondylosis patients: A narrative review. Biomol Biomed. 2023; 23(5): 752-759.

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