

THE EFFECTIVENESS OF MUSCLE ENERGY TECHNIQUES AS AN ALTERNATIVE HOME INTERVENTION FOR NOCTURNAL LEG CRAMPS IN OLDER ADULTS

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ABSTRACT

Nocturnal Leg Cramps, also known as idiopathic leg cramps or night leg cramps, are involuntary spasms. This is a musculoskeletal disorder characterized by suddenly occurring, episodic, persistently painful contractions of the calf, hamstrings, or foot muscles at night. The purpose of the study was to administer the facts in comparing the effectiveness of muscle energy techniques and proprioceptive neuromuscular facilitation exercises in terms of frequency, duration, and intensity that older adults with nocturnal leg cramps experience. The treatments used were muscle energy techniques and proprioceptive neuromuscular facilitation in determining the frequency, duration and intensity of the nocturnal leg cramps. The treatment involved a continuous 6-week stretching program to compare the effectiveness of both stretching exercises. The pre-test and post-test differences of muscle energy techniques and proprioceptive neuromuscular facilitation showed that these two treatments were equally effective. Comparing the experimental treatment to a gold standard, the muscle energy technique resulted in a new alternative management for nocturnal leg cramps. The findings fully support the researchers' theoretical framework. Muscle energy technique resulted in a new alternative treatment for nocturnal leg cramps. The experimental group is effective as an alternative home intervention for nocturnal leg cramps in older adults.

Keyword: Nocturnal leg cramps (NLC), Proprioceptive neuromuscular facilitation (PNF), Muscle energy techniques (MET)

1. INTRODUCTION

Nocturnal Leg Cramps (NLC), also known as idiopathic leg cramps or night leg cramps, are involuntary spasms. This is a musculoskeletal disorder characterized by suddenly occurring, episodic, persistently painful contractions of the calf, hamstrings, or foot muscles at night. Cramps also manifest when resting in the daytime. The primary morbidity of this disorder is sleep disturbance and its next-day consequences. There is no record about the causation of NLC. However, it is suggested that shortened muscle length, among older less physically active people, is a risk factor (Allen, 2012). This is the reason why the researchers found NLC to be a great topic for home intervention. One common practice for increasing range of motion is proprioceptive neuromuscular facilitation (PNF). Few studies have been done regarding the theoretical mechanisms of proprioceptive neuromuscular facilitation. The main goal of proprioceptive neuromuscular facilitation is to increase range of motion and performance (Hindle et al., 2012). It has shown a positive result on active and passive range of motions. According to Physio.co.uk, Muscle Energy Technique (MET) is based on reciprocal inhibition which is the theory that when a muscle is contracting, the opposite muscle of the joint is relaxing. Meaning, if the physical therapist allows the patient's muscle to contract, the opposite muscle is being stretched. It allows the patient to contract and stretch the muscle to its extent and take the joint to its full range of movement. If muscle energy techniques are regularly done with proper guidance, gains can be made in muscle flexibility and strength. The researchers made this the experimental group in the home intervention for nocturnal leg cramps because it will help the participants to not only reduce the occurrence of cramps, but also to improve muscle capability.

1.1 Literature Review

Muscle cramps result in continuous, involuntary, painful, and localized contraction of an entire muscle group, individual single muscle, or selected muscle fibers (Bordoni et al., 2020). Generally, cramps may be idiopathic or having known causes with healthy subjects or in the presence of disease. To determine the various causes of muscle cramps, medical history, physical examination, and a limited laboratory screen are required. The non-drug treatments for leg cramps are putting soap in the bed, stretching exercises, thermal measures, mobilization of legs, massage of legs, increasing hydration, anti-cramp teas, anti-cramp mattress, Hépar® mineral water, eating chocolate, elimination of cheese, eating honey, and swimming (Lorenzo et al., 2017). The importance of such intervention was to minimize the frequency, duration, and intensity of cramps and increase flexibility, as well as muscle strength. The following literature review served as the basis for building up the framework of this study.

1.2 Synthesis

Chaitow (2013) showed that MET and PNF were slightly identical. Both can be used in treating muscle tightness, spasm, and cramps. This was supported by the study of Arimura & Rosales (2016) suggesting that there was a correlation between the effectiveness of physical therapy and nightly stretching before going to bed in managing nocturnal leg cramps. However, it was mentioned in the study of Miller et al. (2017) and Panza et al., (2014) that PNF techniques may not have a significant effect on cramp susceptibility and cramp threshold frequency. Aside from these, numerous researches from multiple authors (Hallegraeff & de Greef, 2020); Andrews & Pine (2018); Singh et al., (2017); Rhyu et al., (2015); Konrad et al., (2016) concluded that physical rehabilitation was a possible intervention for nocturnal leg cramps. Proprioceptive neuromuscular facilitation and pre-stretching regimen could be beneficial as a safe stretching regimen of six weeks for the management of nocturnal leg cramps, without any side effects. It was effective for reducing the frequency and intensity of pain. Furthermore, the authors also mentioned the additional effects of the PNF techniques such as improving ROM, flexibility, muscle strength, and balance in the lower extremity. On the other hand, multiple authors (Phadke et al., 2016); Jeong et al., (2017); Patel et al., (2019) also showed the common effects of using muscle energy techniques in the alleviation of pain, improving the range of motion, decreasing the functional disability, and treating the tightness in the muscles. Aside from this, Moeini & Boroumand, (2016) revealed the efficacy of text messaging and telephone follow-up program was effective in promoting the cardiac self-efficacy of patients with CAD. This was correlated in the study of Bernardo et al., (2004), who concluded that text messaging also increased the retailing skills of CVD clients.

2. METHODOLOGY

The study population was separated into two: 1) experimental group MET and 2) control group PNF. Each group consisted of 15 respondents. The researchers used the purposive sampling technique. Judgment was made about which cases should be selected to provide the best information to address the purpose of the research. The lottery method was used for assigning the respondents into the control and experiment groups. Random numbers from a container represent 38 each respondent thus, giving all the individuals an equal chance to be chosen, avoiding biases.

2.1 Research design

This study utilized true experimental research, specifically the before-after-two group design. The researchers evaluated the respondents before and after the 18 treatment sessions. For the pre-test and post-test, the researchers used the Numeric Pain Rating Scale (NPRS) and a weekly diary for the respondents. The data acquired using this type of research design helped the researchers to numerically compare the effects of both intervention groups in terms of frequency, duration, and intensity, which were important in answering the hypotheses of the study.

2.2 Source of data

The primary sources of data were the results obtained from the utilization of 1) CIPA prevalence questionnaire, which extracted the respondents into the inclusion and exclusion criteria; 2) Weekly diary, which measured the frequency and duration and; 3) the Numeric Pain Rating Scale (NPRS), as an outcome measuring tool for pain intensity. The researcher compared the effects of MET and PNF to determine the difference between the pre-test and post-test methods among elderly patients through 6 weeks of training.



Fig -1: Weekly Diary

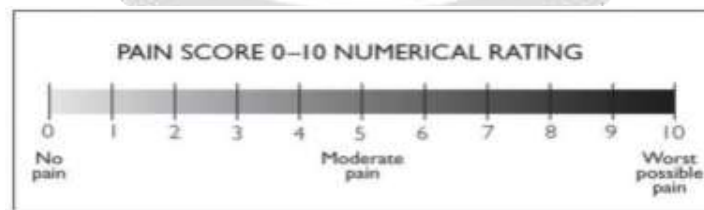


Fig -2: Numeric Pain Rating Scale

CIPA PREVALENCE QUESTIONNAIRE

You have received this survey because you are interested in participating in our thesis. (Ilaw ay naitatangap ng survey na to dahil ikaw ay interesado sa kumpleto sa ating thesis na may pamagat na "The Comparative Study on the Effectiveness of Proprioceptive Neuromuscular Facilitation and Muscle Energy Techniques as a Home Exercise Intervention for Nocturnal Leg Cramps in Older Adults".)

PRESENCE AND MAIN FEATURES OF CRAMPS

Answer the following statements that concern with cramp related issues.

1. Do you suffer from cramps? Definition: Spasmodic, painful involuntary muscle contraction * when resting, lasting from a few seconds to a few minutes.

Hakikatnang ka ba ng publikat? (Igitang pigtatukit ng halamnan kagay nagpapating na tumatagal nang ilang segundo hanggang ilang minuto)

Yes

No

2. Have you been suffering from cramps for more than one month? *

Hakikatnang ka ba ng publikat nang higit pa sa isang buwan?

Yes

No

Name (in facebook for contact purposes)

Short answer text

Age *

Short answer text

Gender *

Female

Male

Fig -3: CIPA Prevalence questionnaire sample

2.3 Population of the Study

The population of the study was composed of 30 respondents, aged 50 to 60-year-old individuals from Biñan, Laguna, Either Male or Female, should have felt either of the following at least 3 times or more within a month, and experiences sleep disturbance due to muscle cramps.

3. RESULTS

1. The comparison of improvements between MET and PNF in terms of frequency. The frequency difference of MET's pre-test and post-test was 0.82. The frequency difference of PNF's pre-test and post-test was 0.93. Therefore, there was no significant difference in the improvements between MET and PNF in terms of frequency
2. The comparison of improvements between MET and PNF in terms of duration. The duration difference of MET's pre-test and post-test was 9.66. The duration difference of PNF's pre-test and post-test was 16.93. Therefore, there was no significant difference in the improvements between MET and PNF in terms of duration.
3. The comparison of improvements between MET and PNF in terms of intensity. The intensity difference of MET's pre-test and post-test was 1.99. The intensity difference of PNF's pre-test and post-test was 2.86. Therefore, there was no significant difference in the improvements between MET and PNF in terms of intensity.

4. DISCUSSIONS

The results indicated that PNF and MET in terms of frequency, duration and intensity of pain have no significant difference. To evaluate, the researchers gathered 30 healthy participants with nocturnal leg cramps and divided them into two, the control group did the PNF exercises, and the experimental group did the MET exercises. On the subjective pain assessment, it is measured by numeric pain rating scale to evaluate the intensity of pain and weekly diary to evaluate the frequency and duration of pain. The results show that there is no significant difference were observed between the groups, therefore MET is effective as PNF and can be use an alternative home exercise in treating NLC.

Table -1: Comparison of improvements between MET and PNF in terms of frequency

Comparison of improvements between MET and PNF in terms of frequency.

	MET	PNF		t-value			
	Mean 1	Mean 2	Mean Difference	Computed	Critical	Interpretation	p-value
Frequency	0.82	0.93	0.11	-0.33	2.1448	NOT SIGNIFICANT	0.7434

0.05 level of significance

Degree of Freedom = 14

n= 15

Table -2: Comparison of improvements between MET and PNF in terms of duration

Comparison of improvements between MET and PNF in terms of duration.

	MET	PNF		t-value			
	Mean 1	Mean 2	Mean Difference	Computed	Critical	Interpretation	p-value
Duration	9.66	16.93	7.27	-0.78	2.1448	NOT SIGNIFICANT	0.4511

0.05 level of significance

Degree of Freedom = 14

n= 15

Table -3: Comparison of improvements between MET and PNF in terms of intensity

Comparison of improvements between MET and PNF in terms of intensity.

	MET	PNF		t-value			
	Mean 1	Mean 2	Mean Difference	Computed	Critical	Interpretation	p-value
Intensity	1.99	2.86	0.87	-0.72	2.1448	NOT SIGNIFICANT	0.4843

0.05 level of significance

Degree of Freedom = 14

n= 15

According to Kisner & Colby (2017), muscle energy techniques (MET) are manipulative procedures that are designed to lengthen muscle and fascia and to mobilize joints. As the author further described, the procedure utilizes the voluntary muscle contractions in a precisely controlled direction and intensity against a counterforce applied by the practitioner. MET is commonly used in both upper and lower extremities to alleviate pain, improve range of motion, decrease functional disability, and treat the tightness in the muscles. In other studies, Oxford Sports Therapy (2017) stated, the following benefits of muscle energy techniques are restoring the normal tone in hypertonic muscles, strengthening weak muscles, improving joint mobility and flexibility. This article was supported by the systematic reviews of Thomas, Cavallaro, Bianco & Palma (2019) in terms of reducing chronic pain and acute pain of the lower back, the effectiveness of treating chronic neck pain and chronic lateral epicondylitis and increasing the range of motion of a joint when a functional limitation is present.

The methodological choices were constrained by a participant who opted out of the study, and due the pandemic Covid-19, the researchers were strictly advised to avoid physical contact with the participants which hinder them to teach the respondents the precise way to do the exercises. Since the target participants were older adults, the researchers had some difficulties on gathering data and meetings. The researchers would recommend to use an app that the participant can download and use to input their assessments. Longer studies will be needed and a larger series of patients to confirm these findings.

5. CONCLUSIONS

The pre-test and post-test differences of Muscle Energy Techniques (MET) and Proprioceptive Neuromuscular Facilitation (PNF) showed that these two treatments are equally effective. Comparing the experimental treatment to a gold standard, which is proprioceptive neuromuscular facilitation, muscle energy technique resulted in a new treatment for nocturnal leg cramps. The findings fully support the researchers' theoretical framework. The experimental treatment, the muscle energy techniques, is effective as an alternative home intervention for nocturnal leg cramps in older adults.

6. REFERENCES

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