

Effect of Muscle Energy Technique on Quadratus Lumborum for Coastal Patients with Chronic Non-Specific Low Back Pain - A Randomized Controlled Study

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Back pain, Non-specific, Muscle energy technique, Quadratus lumborum, Strengthening exercises, Interferential therapy.

Abstract:

Background: Patients living on the coast may develop chronic back pain as a result of prolonged sitting or standing, repetitive motions, and heavy lifting, emphasizing the importance of proper posture and regular exercise. The most common musculoskeletal problem in both developed and developing countries is low back pain. It is the main factor in activity restrictions and productivity loss which results in large annual medical expenses. Muscle energy technique can be utilized to mobilize a limited articulation, lengthen and strength muscles, improve fluid dynamics and reduce local. Aims: To determine the quadratus lumborum's response to the Muscle Energy Technique for persistent, non-specific low back pain. To evaluate and contrast results like pain and functional mobility.

Methodology: It is an experimental study 30 patients diagnosed as chronic non specific low back pain from orthopaedic department of Mahatma Gandhi Medical college and Research Institute, were recruited as a participants for this study. After the selection process the selected participants were randomly allocated in to Muscle energy technique group and control group by odd or even method. The group of muscle energy technique received muscle energy technique along with strengthening exercise and Interferential therapy for 6 weeks (30 minutes per session, 4 sessions in a week). The control group was receiving strengthening exercises and Interferential therapy for 6 weeks (20 minutes per session, 4 sessions in a week).

Results: With the obtained data, post test score of both groups are significantly effective in improving the functional ability and also pain was reduced in patients with chronic nonspecific low back pain.

Conclusion: Learning the special way to decrease disability is needed. The study concluded that the muscle energy technique group is more effective in reducing pain and improves functional disability when compared to control group in our coastal patients

1. Introduction

The most common musculoskeletal problem in both developed and developing countries is low back pain^[1-3]. It is the main factor in activity restrictions and productivity loss which results in large annual medical expenses^[3,4]. According to studies the frequency of low back pain along the general population is between 30 to 80% worldwide and rise with age^[5]. Additionally

poor socioeconomic positions and lower levels of education have been linked to a higher prevalence of low back pain^[5,6]. It has been hypothesized that the burden of low back pain is larger in lower and middle income nations due to association between the frequency of low back pain and socioeconomic background and educational attainment^[7,8]. Several health care professionals have used a range of treatment modalities to treat low back pain. Low back pain costs

are estimated at annually 5% to 10% of adults experiencing pain^[9]. In 2016, 42.4% of Indians reported having low back pain. The absence of structural changes is a characteristic of non specific low back pain and the changes involves reduction in disc space, nerve root compression, joint or bone damage, scoliosis or lordosis both of which can cause low back pain. Nonspecific LBA does not change structurally, it can interfere with the daily life and make it difficult to work^[10]. Muscle energy technique is the treatment procedure the patients contracts their muscle voluntarily in a precisely controlled direction and at varying intensities. Muscle energy technique is to enhance the musculoskeletal functions and lessen discomfort. Muscle energy technique is osteopathic soft tissue manipulation techniques that combines carefully directed and controlled patient-initiated isometrics and or isotonic contractions. Muscle energy technique can be utilized to mobilize a limited articulation, lengthen and strength muscles, and reduce local edema^[11]. Muscle energy technique alter the motor programming of the target joint by acting on joint proprioceptors and mechanoreceptors which has on impact on descending pathway. It also changes their visco elastic material for pain relief and enhance mobility and increase in the stretch tolerance^[12]. Quadratus lumborum that connects the pelvis to the spine and its unilateral contraction results in both extension and side bending to the same side, it is a common cause of lower back discomfort. The muscles that stabilizes the area such as quadratus lumborum and rectus abdominus as well as the psoas and erector spinae of the thoracolumbar region are frequently spasmed or tightened in dysfunction.

Since the quadratus lumborum plays a role in the exhalation through both its merging and it's attachment to the 12th rib involvement in respiratory dysfunction is possible because it's fibres merge with the diaphragm. If the lateral fibres are impacted quadratus tightness or trigger points may cause pain in the lower ribs and along the Iliac crest. Sacroiliac joint and buttock pain can be brought on by trigger points or tightness on the medial fibres^[13]. The Strengthening exercise that incorporating both core stability, core physical strength, muscle endurance, coordination, strength and proprioception is more effective for people with chronic nonspecific low back pain. Moreover it might increase flexibility and range of motion^[14]. These exercises can help to strengthen the

muscles that support the lower back to reduce pain and prevent injury. It can also impede the possibility of disability in elderly people with low back pain. The aged adults with low back pain may have improved muscle functioning and other functional performances as well as the prevention of increasing degenerative changes in muscles^[15].

2. Methodology

It is an experimental study 30 patients diagnosed as chronic non-specific low back pain from orthopaedic department of MGMCRI are recruited based on the selection criteria, inclusion criteria comprise age group between 40-45 years, persons with low back pain more than 6 weeks of duration, both male & female. The exclusion criteria comprise Spondylolisthesis, Patients with spinal stenosis, Osteoporosis, Cauda equina syndrome, patient with back pain due to lumbosacral strain or facet joint arthritis, Infection, Malignant spinal conditions, Fracture, Dislocation, Potts disease, patients with previous lumbar spine surgery and any other orthopedic pathology are excluded from this study. After the selection process the selected participants are allocated in to Muscle energy technique group and control group by odd or even method. The Pre-test of Pain and Functional disability are assessed by using Visual analog scale (VAS) and Oswestry low back pain Questionnaire. The collected data are recorded as baseline data. The muscle energy technique group has received muscle energy technique along with strengthening exercise and Interferential therapy for 6 weeks (30 minutes per session, 4 sessions in a week).

The control group has received strengthening exercises and Interferential therapy for 6 weeks (20 minutes per session, 4 sessions in a week). The Strengthening exercises include elbow plank, Knee to chest stretch, pelvic bridge exercises, Cobra stretch, Cat and camel exercise, Thoracic extension exercise, Quadruped arm and leg raise, Seated lower back rotation for 4 sessions in a week. After the 6th week the post test assessment of Pain and Functional disability are assessed as done in the pre-test and recorded. Based on the data analysis the results are obtained.

Treatment Protocol Muscle Energy Technique (Met) Group

The Muscle energy technique group received Muscle energy technique on Quadratus lumborum for 4

sessions per week for 6 weeks of duration and each session lasting for 30 minutes along with Conventional therapy which includes strengthening exercises lasted for 6 weeks and consists of 4 sessions per week for a total of 24 sessions. Each session was last for 20 minutes and Interferential therapy (IFT). Muscle energy technique procedure on quadratus lumborum involves,

- Patient in side bend position and heels off edge of the table
- Practitioners stabilising on pelvis
- Patient and practioner hand interlocked in patient's axillary region
- And then stretch the quadratus lumborum

CONTROL GROUP

The Control group received Strengthening exercises and Interferential therapy. The Strengthening exercise training programme lasted for 6 weeks and consists of 4 sessions per week for a total of 24 sessions. Each session was last for 20 minutes

1. Elbow plank

The classic plank in push-up position is easier than the elbow plank. Starting on forearms and knees while laying face down on the floor can help us tone our core, whilst also enhancing our balance and steadiness



Figure :1 Muscle energy

2. Knee to chest stretch

Subject should be in a backwards lying position with straightened back and outstretched legs. Keep your lower back and hips flat on the ground. Put your hands on your right leg and bend your right knee towards your chest. Next, take a deep breath and hold for 10 to 30

seconds. Relax now and bring your knee back to its initial position. Repeat on the other side.



Figure 2: Conventional therapy (Interferential therapy)

3. Pelvic bridge exercise

In a supine position, the subject ought to press their heel into the mat, engage their flutes and lift their pelvis off the ground until their body is in a straight line from chin to knee, resting on their shoulders and inhaling. In order to resume the initial position, lower pelvis.



Figure 3: Knee to Chest stretch exercise

4. Cobra stretches

The subject should put his or her hands directly under their shoulders, palms down and fingers pointing forward. Keep the pubic bone, bottom of the ribs, and abdomen on the ground while raising the head, shoulders, and chest. Arc back slowly and softly, elevating the chest while keeping your shoulders back and away from your neck and ears.



Figure 4: Pelvic bridge exercise



Figure 7: Quadruped arm and leg raise

5. Cat and camel exercise

Cat exercise: Lift your head up while lowering your back towards the floor and extending your tailbone to create a curvature in your spine. At the same time, let out a large breath. Exercise for a camel's hump: Tuck your head and tailbone in while arching your back.



Figure 5: Cat and camel exercise

6. Thoracic extension exercise

Lengthen your spine by placing your hands behind your neck. Keep your feet firmly planted, take a deep breath, and stretch your upper back over the chair's back. Return to a tall sitting position after exhaling.



Figure 6: Thoracic extension exercise

7. Quadripod arm and leg exercise

Raise your opposite arm and leg straight out, keeping your abs braced, stomach in and your whole body in one straight line from head to foot.

8. Seated lower back rotation

Sit on a stool or a chair without arms. Overlap your right and left legs. Twist and extend to the side while bracing your left elbow against the outside of your right knee. Ten seconds of holding. On the other side, repeat. Three to five times on each side, twice daily, should be spent on stretching.

OUTCOME MEASURES

The outcome measures that were evaluated to ascertain the effectiveness of the treatment. The outcome includes back pain level and functional ability level. All measurements were performed at baseline (week 0) and at the end of the intervention (week 6).

The intensity of pain was assessed using the visual analog Scale (VAS). It is a valid and reliable measure to report pain. It has a 100 mm horizontal line with the left end of the line labelled as "no pain" and the right end as "severe pain". The Functional disability was assessed by Oswestry low back pain questionnaire, it consists of 10 sections to assess low back pain, each section has 6 responses and scored from 0 to 5. Scores obtained in individual sections are summed up and converted to get percentage. This percentage gives the patient-perceived level of disability, with "0" indicating no disability and a higher.

Statistical Analysis

The pre and post test analysis of pain in group A based on the data collected. The mean and standard deviation of pre-test was 8.47 ± 1.3 and post test was 1.13 ± 0.3 respectively. The p-value is 0.001 and the z-value is -3.429 is illustrated in **table 1**. This demonstrates that the pre and post test differed significantly. There is statistically significant difference because the level of significance is set at ≤ 0.05 .

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The pre and the post test analysis of pain in group B based on the data collected. The mean and standard deviation of pre-test was 7.87 ± 1.06 and post test was 1.60 ± 0.73 respectively. The p-value is 0.001 and the z-value is -3.425 is illustrated in **table 2**. This demonstrates that the pre and post tests differed significantly. There is statistically significant difference because the level of significance is set at ≤ 0.05 .

The pre and post test analysis of pain in group A based on the data collected. The mean and standard deviation of pre-test was 33.53 ± 17.54 and post test was 20 ± 9.258 respectively. The p-value is 0.0133 and the z-value is -2.642 is illustrated in **table 3**. This demonstrates that the pre and post test differed significantly. There is statistically significant difference because the level of significance is set at ≤ 0.05 .

The pre and post test analysis of pain in group A based on the data collected. The mean and standard deviation

of pre-test is 58.4 ± 16.119 and post test is 43.73 ± 12.58 respectively. The p-value is 0.009 and the z-value is -2.779 are illustrated in **table 4**. This demonstrates that the pre and post test differed significantly. There is statistically significant difference because the level of significance is set at ≤ 0.05 .

3. Results:

According to the statistical analysis the MET group post pain data shows the p value is 0.001(0.05) which is significant. The post test mean value of pain is lesser than pre test pain. The mean value of pain in Pre test of muscle energy technique group is 8.47 and the mean value of post test is 1.13 it shows there is reducing pain in the post test MET group. The mean value of Functional disability in pre test of MET group is 33.53 and the mean value of Functional disability in post test of MET group is 20. It shows there is improvement in the functional disability in post test of muscle energy technique group.

PRE AND POST DATA ANALYSIS FOR PAIN OF MET GROUP

Table 1: Analysis of Pre and post test for pain of MET Group

PAIN	SAMPLE SIZE	MEAN	STANDARD DEVIATION	Z-VALUE	P-VALUE
PRE_TEST	15	7.87	1.06	-3.425	0.001
POST_TEST	15	1.6	0.73		

PRE AND POST TEST DATA ANALYSIS FOR PAIN OF CONTROL GROUP

Table 2: Analysis of Pretest and Post-test for Pain of Control group

PAIN	SAMPLE SIZE	MEAN	S. D	Z-VALUE	P-VALUE
PRE-TEST	15	8.47	1.3	-3.429	0.001
POST-TEST	15	1.13	0.3		

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PRE AND POST TEST ANALYSIS FOR FUNCTIONAL DISABILITY OF MET GROUP

Table 3: Analysis of Pre-test and Post test for Functional disability of MET Group

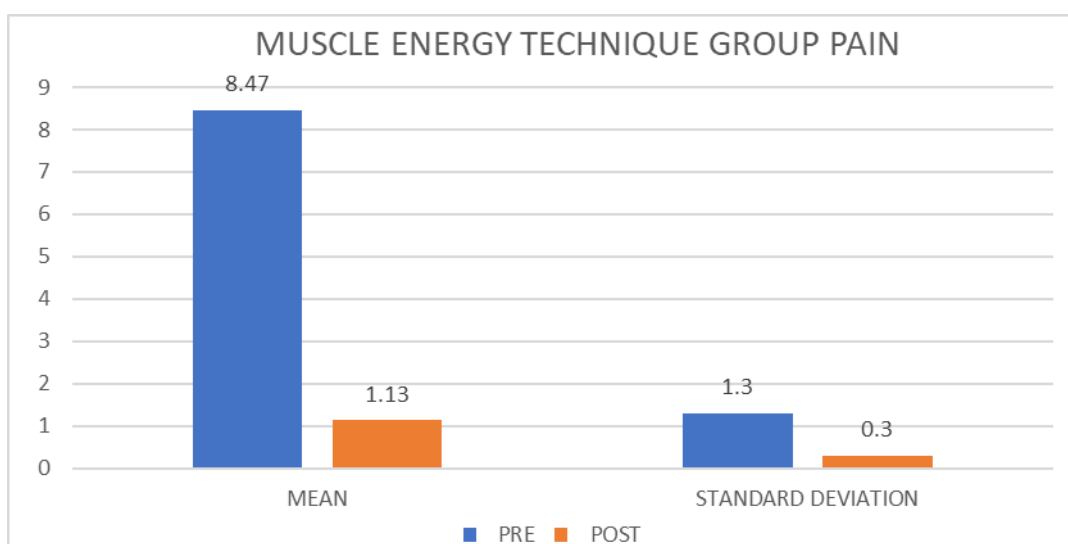
FUNCTIONAL DISABILITY	SAMPLE SIZE	MEAN	STANDARD DEVIATION	Z VALUE	P VALUE
PRE-TEST	15	58.4	16.119	-2.779	0.009
POST-TEST	15	43.73	12.58		

PRE AND POST TEST ANALYSIS FOR FUNCTIONAL DISABILITY OF CONTROL GROUP

Table 4: Analysis of Pre-test and Post test for Functional disability of Control group

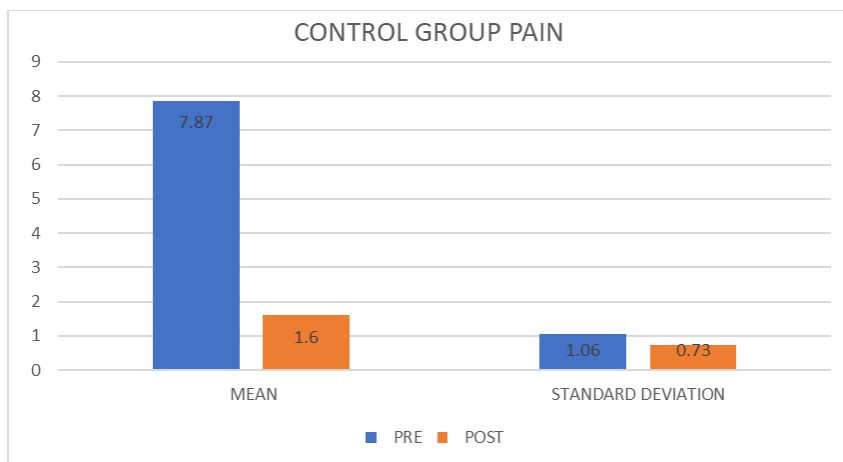
FUNCTIONAL DISABILITY	SAMPLE SIZE	MEAN	S. D	Z VALUE	P-VALUE
PRE_TEST	15	33.53	17.54	-2.642	0.0133
POST_TEST	15	20	9.258		

Graph 1: Statistical analysis of pain for Muscle energy technique group

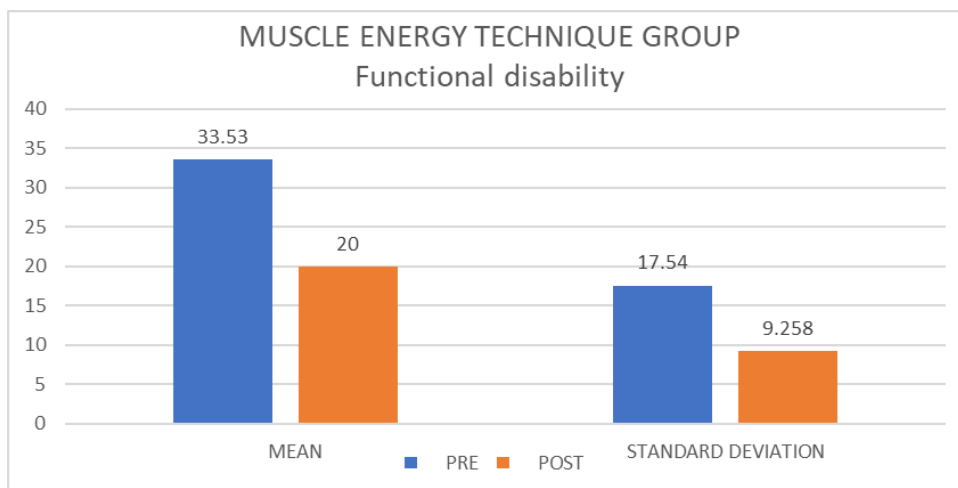


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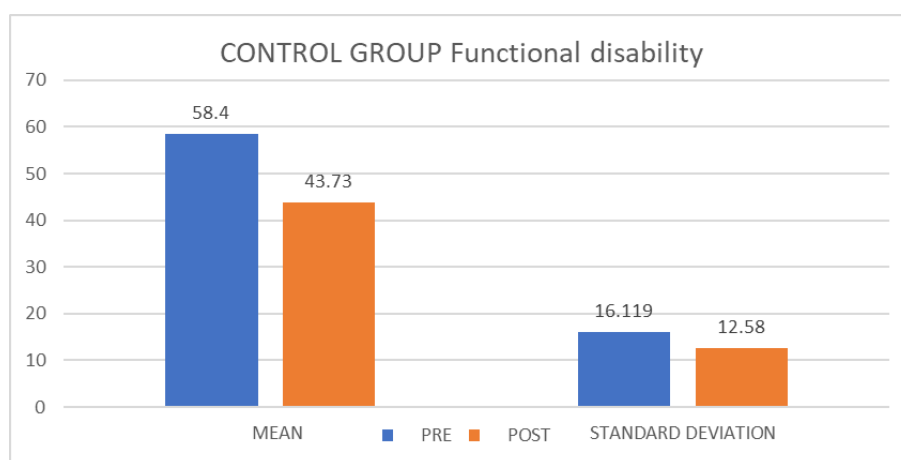
Graph 2: Statistical analysis of pain for Control group



Graph 3: Statistical analysis of Functional disability for Muscle energy technique group



Graph 4: Statistical analysis of Functional disability for Control group



4. Discussion

This study found that the method of muscle energy on quadratus lumborum muscle improves the Functional disability and reduces the pain among chronic NSLBP participants. We came to this conclusion through the statistical analysis of obtained data. Pre test and post test data of both Muscle energy group and Controlled group showed statistically significant in pain $0.001 (<0.05)$ and functional disability $0.013 (<0.05)$, from these analysis it is found that the both technique is effective in reducing pain and improving the functional disability among chronic non specific low back pain. The post mean values of pain (1.13) and functional disability (20) in MET groups. The post mean values of pain (2.60) and functional disability (43.73) in control group. This mean values clearly denote that the Muscle energy technique on quadratus lumborum muscle among chronic non specific low back pain is effective in reducing pain and improving functional disability than the conventional physiotherapy.

Pain and its relation to functional disability:

When statistically analyzing the data there is a fact we found that the pain is doubling the functional disability. It is matched to the subjective assessment of the participants during the pre data procurements, all the participants felt that the pain is actually restricting them to do the activities they are wanted to do.

Priyanka Dhargalkar et al (2017) conducted a study among chronic non specific low back pain, their study they give muscle energy technique to quadratus lumborum, erector spinae, iliopsoas, tensor fascia latae and their control group received conventional physiotherapy (TENS, hot packs, strengthening exercises), they concluded that MET is reducing the pain and improving functional disability than the control group. For functional disability they used Oswestry Disability Index which clearly gives improved functional activities in the group which underwent MET, Our findings also same as their finding but the difference is they gave MET to four different muscles around the low back region but we concentrated only on quadratus lumborum because it is the main source of the low back pain because it connects pelvis to the spine, it would have been accurate if we also added more muscles due to shorter duration and lack of samples we limited with quadratus lumborum alone.

Poonam Tawrej et al (2020) conducted a study on Muscle energy technique on quadratus lumborum muscle along with conventional physiotherapy which includes hot pack application among chronic non specific low back pain in improving pain and lumbar ROM. They found MET is effective than the conventional physiotherapy in reducing pain and improving lumbar ROM. The intervention and the muscle which got intervention are same as our study but outcome measure is different they measured Lumbar ROM instead of we used functional disability, it is evident that one who is having good lumbar ROM can only have good functional ability.¹⁵⁻¹⁷

LIMITATIONS

The result of the current study indicates that the Muscle energy technique group shows more significant than the control group. The current study may have some limitations.

- The current study does not involve a long term follow up
- As the study was limited to only 30 patients, it would have been better if the study was done in a larger group
- Participants with spondylolisthesis, spinal stenosis, osteoporosis, cauda equina syndrome, lumbosacral strain, fracture, dislocation, Pott's disease and previous lumbar spine surgery were excluded in this study.

5. Conclusion

Patients living on the coast may develop chronic back pain as a result of prolonged sitting or standing, repetitive motions, and heavy lifting, emphasising the importance of proper posture and regular exercise. The study concludes that the muscle energy technique was more effective in reducing pain and improving functional disability for patients with chronic nonspecific low back pain. Hence the present results indicate that muscle energy technique as a learning and practicing strategy, represents a promising approach to providing rehabilitation therapy to patients with chronic non-specific low back pain.

CONFLICT OF INTEREST- Nil

FUNDING

There is no funding for this study

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AUTHOR CONTRIBUTION

Text preparation was done by Dr. V. Velkumar, Data collection and Data analysis was done by DHIVYA, Overall supervision and communication were done by prof. E. Shanmugananth

References

- [1] Usman Abba Ahmed,Thayananthee Nadasanb, Jessica Van Oosterwijck and Sonill Sooknunan Maharajb.Journal of Back and Musculoskeletal Rehabilitation 34 (2021) 179–193 179,DOI 10.3233/BMR-200011,IOS Press,ISSN 1053-8127/\$35.00 c 2021
- [2] Poonam Tawrej, Ravinder Kaur, Snehal Ghodey Indian Journal of Physiotherapy and Occupational Therapy, January-March 2020, Vol. 14, No. 1. DOI Number: 10.5958/0973-5674.2020.00032.5
- [3] Siddhi V. Bhosale, Mayuri Burungale, Journal of Ecophysiology and occupational health,<https://doi.org/10.18311/jeoh/2021/28561> Volume 21, Issue 4, December 2021
- [4] Priyanka Rishi, Bharti Arora International Journal of Physiotherapy and Research,Int J Physiother Res 2018, Vol 6(3):2748-53. ISSN 2321-1822,DOI: <https://dx.doi.org/10.16965/ijpr.2018.129>
- [5] Ewan Thomas, Antonio Rosario Cavallaro, Diba Mani, Antonino Bianco and Antonio. Palma, Chiropractic & Manual Therapies (2019) 27:35,<https://doi.org/10.1186/s12998-019-0258>
- [6] Deepali Sharma, Siddhartha Sen, International Journal of Physiotherapy and Research, 2014, Vol 2(1):305-11. ISSN 2321-1822
- [7] Katie E de Luca et al 2019, J Manipulative Physiol Ther. 2017
- [8] Helge Franke, Gary fryer, Raymond WJG OSTELO, Steven J KAMPER 2015,Cochrane database of systemic review 2015,Issue 2,Art no:CD009852,DOI:10.1002/14651858
- [9] Priyanka Dhargalkar, Anjali Kulkarni,Snehal Ghodey, International Journal of Physiotherapy and Research,Int J Physiother Res 2017, Vol 5(3):2082-87. ISSN 2321-1822
- [10] Sadaf Tubassam, Saima Riaz and et al,Pakistan Journal of medical health and science Vol. 15, NO.8, AUG 2021
- [11] Zidni Imanurrohmah Lubis , Sielma Ajeng Ayulianda, Kurnia Putri Utami,The International Conference of Medicine and Health (ICMEDH)Volume 2022, : <https://orcid.org/0000-0002-5325-1909>, DOI 10.18502/kme.v2i3.11866
- [12] E. Fahmy, H. Shaker, W. Ragab, H. Helmy and M. Gaber, The Egyptian Journal of Neurology, Psychiatry and Neurosurgery (2019) 55:77,<https://doi.org/10.1186/s41983-019-01245>
- [13] Malarvizhi D, Harshavardhan S, Sivakumar VPR 2017, International Journal of Clinical Skills (2017) 11(2), 65–67, IJOCS.1000113 © 2017
- [14] Faryal Zaidi, Ishaq Ahmed 2020,Journal of Pakistan Medical Association,October 2020,Volume 70,Issue 10,ISSN Print :0030-9982,ISSN Linking:0030-9982
- [15] Saru Bansal, Vivek Chauhan, International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org, volume 8, Issue 7 July 2020, ISSN: 2320-288.
- [16] Espinosa-López AM, Daza-Arana JE, Pinzón-Sanabria LM, PerdomoQuiroga Y, Ruiz-Jiménez JP. Effects of muscle energy technique in quadratus lumborum on respiratory muscle strength in patients with breast cancer. Rev. Fac. Med. 2019;67(4):469-75.
- [17] Tawrej, Poonam; Kaur, Ravinder; Ghodey, Snehal. Immediate Effect of Muscle Energy Technique on Quadratus Lumborum Muscle in Patients with Non-Specific Low Back Pain. Indian Journal of Physiotherapy & Occupational Therapy-An International Journal, [S.l.], p. 180-184, mar. 2020. ISSN 0973-5674.