

**EFFECTIVENESS OF THORACIC MOBILITY EXERCISE VERSUS
MANUAL RELEASE TECHNIQUE IN MINIMIZING MECHANICAL
UPPER BACK PAIN AMONG UNDERGRADUATES IN SRI LANKA**

THESIS PROPOSAL

Submitted by

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LIST OF ABBREVIATION

PSEQ – Pain Self Efficacy Questionnaire

BMI – Body Mass Index

VAS – Visual Analogue Scale

MRC – Medical Research Council

ROM – Range Of Motion

EFFECTIVENESS OF THORACIC MOBILITY EXERCISE VERSUS MANUAL RELEASE TECHNIQUE IN MINIMIZING MECHANICAL UPPER BACK PAIN AMONG UNDERGRADUATES IN SRI LANKA

1. INTRODUCTION

1.1 INTRODUCTION WITH LITERATURE REVIEW

Upper back refers to the region anywhere between cervical regions to thoracic region. Pain in this region referred as upper back pain. According to the available literature, there is no any clear definition for upper back pain. In some literature it often referred as thoracic back pain(Fouquet *et al.*, 2015). Thoracic back pain has to consider as a serious issue than neck and low back pain because vital organs such as heart and lungs belong to its anatomical land mark. Thoracic spine mobility affects the mobility of rib cage, stiffness in the thoracic spine reduce the effectiveness of respiratory mechanism.

Thoracic pain mainly occurs due poor posture and overuse injuries. Long term sitting with bad posture leads to the tightness chest muscles mainly pectoralis major, minor, subclavius and intercostals, lead to hunched position, while the muscles of the upper back and neck mainly trapezius, rhomboids, levator scapulae, splenius and erector spinae become weak (Lin *et al.*, 2020). These imbalances can lead to tension and pain. Long term screening which includes smartphone and laptop usage exaggerating this condition among young population (Shete and Shah, 2019; Puntumetakul *et al.*, 2022). In addition to that, mental health factors like academic and personal stressors and physical inactivity significantly influence this condition among high school or undergraduate students (Shan *et al.*, 2013). Further, it was increased after the COVID-19 pandemic (Amro *et al.*, 2020; Leirós-Rodríguez *et al.*, 2020; Akulwar-Tajane *et al.*, 2021; Elghomati *et al.*, 2022).

Generally, Prevalence of acute or subacute thoracic back pain and chronic pain is ranging from 3.4%- 34.8% and 15.6%- 19.5% respectively among general population (Fouquet *et al.*, 2015). Prevalence of Upper back pain among high school students is high, a study conducted among Finnish high school students depicts 17% reported disturbing symptoms in the neck, upper back and shoulder (Niemi *et al.*, 1997). Further a study conducted in Saudi Arabia among undergraduates who are following dentistry complained about neck pain (69.2%) followed by shoulder (67.1%) and upper back pain (46.9%)(Felemban *et al.*, 2021).

A systematic review on “The effectiveness of non-invasive interventions for musculoskeletal thoracic spine and chest wall pain” depicts about lack of quality studies regarding no physical therapy management regarding musculoskeletal thoracic pain. Further, this study shows that, multimodal program includes manual therapy, heat or advice and exercise clinically not important pain reduction like spinal manipulation (Southerst *et al.*, 2015).

Thoracic Spinal mobilization technique forwarded by Maitland suggests that Grade I and II oscillatory technique mainly contributes in reduction of pain can potentially help reduce pain in the spine through several mechanisms including gate control theory, by release of endorphins, and improve blood flow to the muscle and Grade III and Grade IV techniques mainly contributes in improving mobility (Lee and Lee, 2017). Application of Maitland’s mobilization technique grades will be differ according to the patient’s individual factors and pain intensity. In addition, Myofascial release therapy is a type of gentle, constant massage that releases tightness and pain throughout your myofascial tissues. Few literature forwarded that pressure or tension should be applied for nearly 40 to 120 seconds in an angle of 30- 60 degree for the effective release of trigger points(Kim, Sung and Lee, 2017). Application of pressure increases the blood flow and removal of potential waste product from the specific muscle. It will cause the pain reduction. Furthermore, Thoracic mobility exercises are found to be very significant in mobility of the spine and improve the muscle strength of thoracic extensors which mainly includes Cat and Camel exercises, Horizontal chest expansion and cross arm chest expansion (Cho, Lee and Lee, 2017). It aims to enhance the flexibility, strength, and alignment of the spine, while the incorporation of controlled breathing can further aid in relaxation, stress reduction, and improved movement patterns(Csepregi *et al.*, 2022).

Prevalence of musculoskeletal pain among undergraduates in Sri Lanka depicts a significant increase after the COVID-19 due to increase screen time, sitting in long time lecture hours for nearly seven hours and increase of academic work load (Patterson and Warnakulasuriya, 2022). It act as a vicious cycle in increase upper back pain among undergraduates. Proper ergonomic guidance and exercises will be possible solutions for this specific pain. Further, it will help to improve the academic performance among undergraduates and to achieve their future endeavour. In addition, availability of research regarding upper back pain prevalence and physiotherapy treatment is very low.

Proper evidence regarding treatment of upper back pain is very important due to increase of screening and stress day by day. In clinical settings, thoracic mobility exercise combination with breathing depicts a significant improvement in upper back pain rather than manual therapy. As a researcher, effectiveness of both therapies should be checked scientifically.

1.2 OBJECTIVES

General Objective:

To find out the effectiveness thoracic mobility exercise compared with manual release technique in minimizing upper back pain

Specific Objective:

- To evaluate correlation between the sociodemographic factors and pain intensity of participants in experimental and control group.
- To evaluate the effectiveness of thoracic mobility exercise and manual release technique in improving upper back pain intensity
- To evaluate the effectiveness of thoracic mobility exercise and manual release technique in improving upper thoracic mobility
- To evaluate the effectiveness of thoracic mobility exercise and manual release technique in improving trunk upper back muscle strength
- To evaluate the effectiveness of thoracic mobility exercise and manual release technique in improving disability

2. DESIGN AND METHOD

2.1 Study Site:

Study will be conducted University of Peradeniya.

2.2 Study Population:

Undergraduates who are currently having upper back pain for more than seven days will be selected as sample. Participants who will have sub-acute and chronic pain which means who will have pain more than a week or seven days will be selected as sample and who have subjected to any recent surgeries, recent fractures, accidents or injuries in upper back will be excluded from the study.

2.3 Study Setting:

Study will be conducted in Service unit of Department of physiotherapy at University of Peradeniya.

2.4 Study Design:

This study is a Randomized Control Trial, Double- Blinded study. Participants and accessors will be blinded. Participants will be allocated randomly in to two groups which are experimental group which will receive thoracic mobility exercises and control group which will receive myofascial release and joint mobilization treatment.

2.5 Hypothesis:

1. Hypothesis about difference in baseline characteristics of participants between control and experimental groups

Null Hypothesis: $H_0: \mu_1 - \mu_2 = 0$

There is no difference in baseline characteristics of participants between experimental and control group.

Alternate Hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

There is a difference in baseline characteristics of participants between experimental and control group

2. Hypothesis about differences in pain intensity between control group and experimental group.

Null Hypothesis: $H_0: \mu_1 - \mu_2 = 0$

There is no difference in pain intensity of participants between experimental and control group.

Alternate Hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

There is a difference in pain intensity of participants between experimental and control group

3. Hypothesis about differences in thoracic mobility (Range of Motion) between control group and experimental group.

Null Hypothesis: $H_0: \mu_1 - \mu_2 = 0$

There is no difference in thoracic mobility of participants between experimental and control group.

Alternate Hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

There is a difference in thoracic mobility of participants between experimental and control group

4. Hypothesis about differences in muscle strength of spinal extensors between control group and experimental group.

Null Hypothesis: $H_0: \mu_1 - \mu_2 = 0$

There is no difference muscle strength of spinal extensors of participants between experimental and control group.

Alternate Hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

There is a difference in muscle strength of spinal extensors of participants between experimental and control group

5. Hypothesis about differences in disability of participants between control group and experimental group.

Null Hypothesis: $H_0: \mu_1 - \mu_2 = 0$

There is no difference in disability of participants between experimental and control group.

Alternate Hypothesis: $H_1: \mu_1 - \mu_2 \neq 0$

There is a difference in disability of participants between experimental and control group.

2.6 Sample Size:

Sample size is Calculated by using G*power 3.1.9.4 software by assigning power 80% effective size 0.5, type I error = 0.05 and type II error = 0.2. Therefore calculated sample size was 42. Drop down rate of participants is assigned as 25 %. Therefore final sample size which obtained is 60 (Kang, 2021).

2.7 Sampling method:

Simple Random Sampling will be used as sampling technique as well as 30 Participants will be randomly allocated to each group. Participant will be allocated to the groups by using lottery method.

2.8 Data collection:

Undergraduates who are having upper back pain more than 7 days will be selected as sample and those who are having any contraindications, recent surgeries, fractures, accidents will be excluded from the students. Informed consent will be obtained from the participants. Participants will be allocated to one group by blindly select the number by lottery method. Thirty participants will be allocated randomly to each group. Allocation was concealed. Accessors will not be aware of intervention or control group and collect the demographic data, Pain assessment, Range of Motion and muscle strength at the baseline and after two weeks of intervention.

2.9 Data collection tool:

Measurement tool contains two sections such as pre-test and post-test questionnaire. In Pre-test questionnaire, there are six sections which includes personal details of the participants, pain related questions, Measurement of range of motion at base line, muscle strength at base line and pain-self-efficacy Questionnaire (PSEQ) at base line. In Post-test questionnaire, there are 4 sections which include, pain related questions

mainly pain intensity after two weeks, muscle strength after two weeks, Range of motion after two weeks and pain-self-efficacy Questionnaire (PSEQ).

Personal details of the participants will be collected separately for the concealed allocation and participants will be identified by code number. Participants' age, gender, height, weight, BMI, family size, bread winner of the family, monthly income and financial support for the study will be collected in the demographic data section. In third section, questions related to occurrence of pain, pain duration and treatments which were undertaken for the pain will be collected from the participants.

VAS scale will be used to measure the intensity of pain in different situations which include present pain intensity, in sitting, in forward bending, in standing, in walking, in sleeping, in transferring and during day to day activities. Visual Analogue Scale will be used to measure the pain intensity. Subjects will be asked to mark the number between 0 and 10 that fits best to their pain intensity. Zero indicates 'no pain at all' whereas 10 represents 'the worst pain ever possible' (Figure 1). Measurement will be obtained in the baseline and at the end of two weeks.

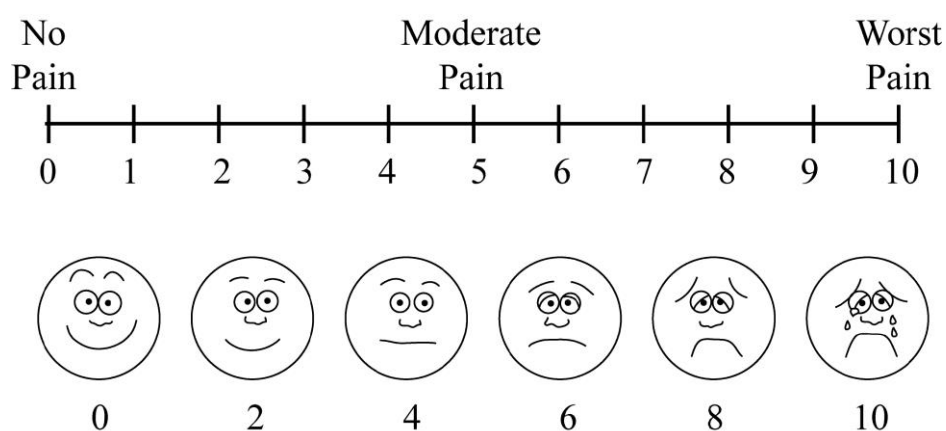


Figure 1- VAS Scale

Thoraco-Lumbar flexion and Extension of thoracic spine Range of Motion will be taken in the fourth section. Measurement will be taken by using measuring tape. Measurement will be taken at the baseline and after two weeks. In the fourth section, muscle strength of thoracic spine extensors will be measured using Oxford-Grading Scale. Measurement will be taken at the baseline and after two weeks. The Oxford Muscle Scale is a numerical rating scale used to quantify the power or strength produced by the contraction of a muscle. The scale was originally developed by a UK government research group called the Medical Research Council (MRC). Reliability of the scale

explained by Intraclass Correlation Coefficient (ICC) and Interrator Reliability. It shows high ICC coefficient of 0.95 (ranging from 0.92 to 0.97) (Hermans et al., 2012).

Muscle Strength Grading Scale (Oxford Scale)	
0/5	No Contraction
1/5	Visible/palpable muscle contraction but no movement
2/5	Movement with gravity eliminated
3/5	Movement against gravity only
4/5	Movement against gravity with some resistance
5/5	Movement against gravity with full resistance

Table 1

In the sixth section, The Pain Self-Efficacy Questionnaire (PSEQ) is a 10-item questionnaire developed to assess the confidence people with ongoing pain have in performing activities while in pain. The PSEQ has high internal consistency (0.92 Cronbach's alpha) and test-retest reliability is high of a 3-month period.

	0 "not at all confident"	1	2	3	4	5	6 "completely confident"
1. I can enjoy things, despite the pain.							
2. I can do most of the household chores (e.g. tidying-up, washing dishes, etc.), despite the pain.							
3. I can socialise with my friends or family members as often as I used to do, despite the pain.							

4. I can cope with my pain in most situations.							
5. I can do some form of work, despite the pain. ('work' includes housework, paid and unpaid work).							
6. I can still do many of the things I enjoy doing, such as hobbies or leisure activity, despite pain.							
7. I can cope with my pain without medication.							
8. I can still accomplish most of my goals in life, despite the pain.							
9. I can live a normal lifestyle, despite the pain.							
10. I can gradually become more active, despite the pain.							

Table 2

2.10 Ethical Considerations:

Ethical approval will be obtained from the Institutional Review Board of Bangladesh Health Professional Institute. Written informed consent will be obtained from all the subjects who are willing to participate in the study. Participation in this research is entirely voluntary basis and the participants have the right to withdraw from the study at any time.

2.11 Outcome measures:

Baseline outcome measures are demographic characteristics of participants such as age, gender, BMI, family size, bread winner of the family, monthly income and financial

support for study; Pain duration; Pain intensity at present moment, sitting, forward bending, standing, walking, sleeping, transferring and pain when performing day to day activities; Range of Motion of thoraco-lumbar flexion and extension; Muscle strength of thoracic spine extensors and overall scale of Pain-Self- efficacy Questionnaire. After two weeks same outcome measures will be obtained other than demographic characteristics and pain duration.

2.12 Data analysis:

Two sample t test will be used to compare the group at baseline to determine the sample characteristics in the both group will be statistically equal. To find out the significant variation in the group after the intervention again two sample t test will be used.

2.13 Time Duration:

This study will be conducted from July 2022 to July 2024, for two years with three months data collection.

3. EXPECTED OUTCOME

The main outcome of this research study find the effectiveness of Thoracic mobility exercise in comparison with manual release technique in treating upper back pain. Over all expected outcome of the research is thoracic mobility exercise will be more effective than manual release technique which includes myofascial release and Maitland's thoracic mobilization technique. Thoracic mobility exercises involve a series of movements and stretches aimed at improving the flexibility, range of motion, and strength of the thoracic spine and spinal extensors. These exercises can target specific muscle groups and promote better posture and spinal alignment. It is anticipated that thoracic mobility exercises will help patients by addressing the root causes of upper back pain. These exercises may improve posture, reduce muscle imbalances, and increase the overall mobility of the thoracic spine.

Myofascial release involves applying sustained pressure to specific trigger points or knots in the muscles and fascia of the upper back. Maitland's thoracic mobilization technique, on the other hand, is a hands-on manual therapy approach that focuses on joint mobilization and spinal manipulation. It provide immediate pain relief by targeting specific areas of tension or dysfunction in the upper back.

In this research, Pain intensity is measured using VAS Scale; Both intervention targeting pain relief; therefore it provides significant pain relief after the administration. In terms of Range of Motion, Strength and Disability, thoracic mobility exercise will provide more improvement compared to the manual therapy technique. Thoracic mobility exercise will provide long term benefit when compared to the manual therapy technique by eliminating root cause of upper back pain.

4. REFERENCES:

- Akulwar-Tajane, I. *et al.* (2021) 'Effects of COVID-19 pandemic lock down on posture in physiotherapy students: A cross-sectional study', *Medical & Clinical Research*, 6(1), pp. 91–102.
- Amro, A. *et al.* (2020) 'Musculoskeletal disorders and association with social media use among university students at the quarantine time of COVID-19 outbreak'.
- Cho, J., Lee, E. and Lee, S. (2017) 'Upper thoracic spine mobilization and mobility exercise versus upper cervical spine mobilization and stabilization exercise in individuals with forward head posture: a randomized clinical trial', *BMC musculoskeletal disorders*, 18(1), pp. 1–10.
- Csepregi, É. *et al.* (2022) 'Effects of classical breathing exercises on posture, spinal and chest mobility among female university students compared to currently popular training programs', *International Journal of Environmental Research and Public Health*, 19(6), p. 3728.
- Elghomati, A. *et al.* (2022) 'Short-term impacts of mobile touch-screen device use on musculoskeletal disorders during Covid-19 pandemic: risk assessment modelling and verification', *South African Journal of Industrial Engineering*, 33(2), pp. 62–77.
- Felemban, R.A. *et al.* (2021) 'Prevalence and predictors of musculoskeletal pain among undergraduate students at a dental school in Saudi Arabia', *Clinical, cosmetic and investigational dentistry*, pp. 39–46.
- Fouquet, N. *et al.* (2015) 'Prevalence of thoracic spine pain in a surveillance network', *Occupational Medicine*, 65(2), pp. 122–125.
- Kim, J., Sung, D.J. and Lee, J. (2017) 'Therapeutic effectiveness of instrument-assisted soft tissue mobilization for soft tissue injury: mechanisms and practical application', *Journal of exercise rehabilitation*, 13(1), p. 12.
- Lee, K.-S. and Lee, J.-H. (2017) 'Effect of maitland mobilization in cervical and thoracic spine and therapeutic exercise on functional impairment in individuals with chronic neck pain', *Journal of physical therapy science*, 29(3), pp. 531–535.
- Leirós-Rodríguez, R. *et al.* (2020) 'Musculoskeletal pain and non-classroom teaching in times of the COVID-19 pandemic: Analysis of the impact on students from two

Spanish universities', *Journal of Clinical Medicine*, 9(12), p. 4053.

Lin, I. *et al.* (2020) 'What does best practice care for musculoskeletal pain look like? Eleven consistent recommendations from high-quality clinical practice guidelines: systematic review', *British journal of sports medicine*, 54(2), pp. 79–86.

Niemi, S.M. *et al.* (1997) 'Neck and shoulder symptoms of high school students and associated psychosocial factors', *Journal of adolescent health*, 20(3), pp. 238–242.

Patterson, N.M. and Warnakulasuriya, S.S.P. (2022) 'Screen Time and Associated Health Problems Among Undergraduates of University of Sri Jayewardenepura, Sri Lanka', *Sri Lankan Journal of Nursing*, 1(1).

Puntumetakul, R. *et al.* (2022) 'Prevalence and associated factors of clinical myelopathy signs in smartphone-using university students with neck pain', *International Journal of Environmental Research and Public Health*, 19(8), p. 4890.

Shan, Z. *et al.* (2013) 'Correlational analysis of neck/shoulder pain and low back pain with the use of digital products, physical activity and psychological status among adolescents in Shanghai', *Plos one*, 8(10), p. e78109.

Shete, M.G. and Shah, R. (2019) 'Effect of posture correction exercises and ergonomic advices in people having postural abnormalities among chronic smartphone users', *International Journal of Health Sciences & Research*, 9(7), pp. 121–125.

Southerst, D. *et al.* (2015) 'The effectiveness of noninvasive interventions for musculoskeletal thoracic spine and chest wall pain: a systematic review by the Ontario Protocol for Traffic Injury Management (OPTIMA) collaboration', *Journal of Manipulative and Physiological Therapeutics*, 38(7), pp. 521–531.

5. APPENDICES

5.1 Annex I: Consent Form

Informed-Consent Form

I am a postgraduate student of Bangladesh Health Professional Institute currently following Masters in Rehabilitation Science program conducting a research on “Effectiveness of thoracic mobility exercises versus manual release technique in minimizing mechanical upper back pain among undergraduates - A Randomized Control Trail.” This study will help to identify the effect of thoracic mobility exercises versus manual release techniques which are used to treat upper back pain among undergraduates. Further, this study will help to identify which treatment method is superior among both treatment methods in reduce pain in upper back in different positions such as sitting, standing, walking, sleeping and transferring, improve muscle strength and improve mobility or movement of upper back.

This form provides you information regarding the above mentioned research and invites you to be a part of this research. You may discuss the research with anyone you are comfortable with before making a decision to participate or not. This form may contain certain words that you may not clearly understand. Please do not hesitate to stop us to inquire from us at any point if you have any questions or need clarification. If any questions/doubts arise at a later time, you may inquire from us at any time during this research.

Information sheet

Academic work load among undergraduates of Sri Lanka is most significantly noticed in renounced universities. Due to increase workload and stress most of the students complained upper back pain. Increased study hours, wrong position which they are following during their studies trigger upper back pain and neck pain among undergraduates. In addition, in Sri Lankan university setting most of the exams are following in hand written method, continuous writing, ergonomic issues in writing and sitting act as provoking factors for upper back pain. Students who are suffered with upper back pain complained poor performance in academics as well as effectiveness in study period also reduced. Even though numerous physiotherapy treatments are available for upper back pain. Students showed improvements in particular treatments.

This study is going to evaluate the most effective treatment method for upper back pain. This study will help for physiotherapists to identify the best treatment method to treat upper back pain. Further, prevalence of upper back pain among undergraduates also will be minimized as well as helps to improve the academic achievement of the undergraduates in Sri Lanka.

Procedure of the Research:

After obtaining your consent to participate in the study, we will assess you and you will be given physiotherapy treatment. The treatment will include manual therapy and exercises which is a routinely practiced treatment approach in physiotherapy clinics to

Measurement	Procedure
Pain	You will be given a scale numbered 0-10. Number “0” indicates “no pain at all”, while number “10” indicates “the worst pain ever possible”. You have to mark a number between 0 – 10 which best describes the amount of pain you have in different positions such as sitting, standing, walking, sleeping and transferring.
Range of Motion	The available range of motion of the back in Forward bending and backward bending will be measured using a small plastic equipment called “inclinator” and measuring tape. You will be positioned appropriately by the physiotherapist, and then the measurements of the movements will be taken
Muscle strength	You will be positioned by the therapist in an appropriate way and strength of back muscle will be examined by the therapist.
Function or Disability	“Pain Self-Efficacy Questionnaire” will be given to assess the confidence to perform a set activities, despite of pain. It consist of 10 questions about the actions on can do in daily life which was rated by using Likert scale from 0 to 6. Here, “0” represents no confidence at all and “6” represents completely confidents. You have to mark your confidence level to perform each actions.

reduce pain, improve mobility and muscle strength in upper back. Proper instructions and demonstrations will be provided prior to each treatment session. This treatment will

be delivered three times weekly for two weeks. One session will last for atleast 20 mins. At the end of the two weeks, you will be assessed again to check for any progressions. COVID19 guidelines will be followed during assessments and treatments.

You will be positioned appropriately by the physiotherapist, and the proper instructions/demonstrations will be provided prior to the treatment session.

Participant selection and voluntary participation:

If you are an undergraduate of any universities in Sri Lanka who is having Upper back pain more or equal to 7 days, you could engage in this study. Your participation in this research is entirely voluntary. If you choose not to participate in this research project, please do not hesitate to let us know of your decision. You can change your mind at any time during this research and stop participating even if you agreed to participate now.

Duration:

Treatment duration will be 2 weeks. You will receive the treatments three times per week, and a minimum of 20 minutes of treatment per day.

Risks/Hazards/Benefits:

You would be able to improve your health status (reducing the pain in upper back) and quality of life by participating in this research, also your participation is likely to help us find the answers to the research question.

You may feel mild discomfort during manual therapy. If you possess any contraindication for the treatments, you will be excluded.

Reimbursement:

We are unable to reimburse you for your participation in this research either monetarily or by any other form of gift(s). We are grateful for your participation.

Confidentiality:

The information that we collect from this research project will be kept confidential. Information about you that will be collected during the research will be put away and no-one but the researchers will be able to see it. Any information about you will have

a number on it instead of your name. Only the researchers will know what your number is and we will lock that information up with a lock and key. It will not be shared with anyone else. Privacy will be maintained when applying the treatments.

Right to Refuse or Withdraw:

You do not have to take part in this research if you do not wish to do so and your decision will not affect any services you may receive at this facility by us as. You may also stop participating in the research at any time you choose. It is your choice and all of your rights will still be respected.

Whom to Contact:

If you have any questions, you may ask us now or later, even after the study has started. If you wish to ask questions later, you may contact any time through the following contact details.

Name with title: Ms Vithursha Sivakumar (researcher)

Contact details: 0764168500

5.2 Annex: II: Data Collection tool

5.2.1 Pre Test Questionnaire

Effectiveness of Thoracic mobility exercises versus manual release technique in minimizing mechanical upper back pain among undergraduates in Sri Lanka

1. Personal Details

1.1 Name :

1.2 Address:

1.3 Permanent Address:

1.4 Phone / Mobile No:

Code No:.....

Effectiveness of Thoracic mobility exercises versus manual release technique in minimizing mechanical upper back pain among undergraduates in Sri Lanka

Code No:.....

2. Demographic Data

- 2.1 Age :
- 2.2 Gender :
- 2.3 Height :
- 2.4 Weight :
- 2.5 BMI :
- 2.6 Family Size :
- 2.7 Bread Winner of the family:.....
- 2.8 Monthly Income :
- 2.9 Financial support for study:.....

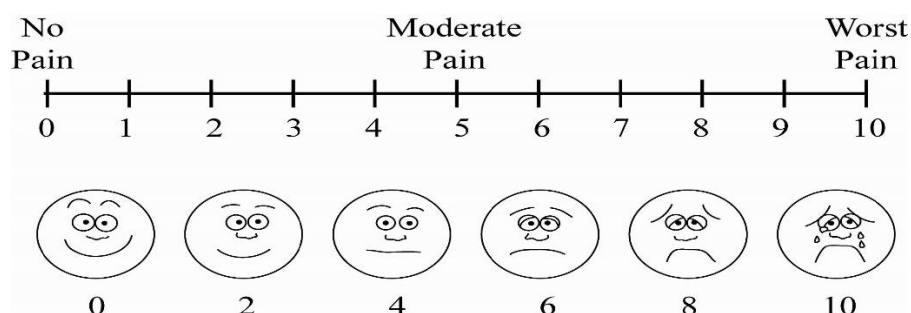
Pre Test Questionnaire

3. Pain related questions:- Baseline

- 3.1 How long have you been experiencing Upper back or thoracic pain?
.....
- 3.2 When did your pain occur for the first time?
.....
- 3.3 What are the treatments that you underwent so far?
.....

In the following scale, mark a number which best describes your pain. Number “0” indicates “no pain at all”, and number 10 indicates “the worst pain ever possible”. You

have to denote the number which best describes your pain in following instance and please denote the number respective to each activity in the following chart.



Aspect	VAS/ Pain scale number
3.4 Present Pain Intensity	
3.5 Sitting	
3.6 forward Bending	
3.7 Standing	
3.8 Walking	
3.9 Sleeping	
3.10 Transferring	
3.11 Performing day to day activities	

4. Range of Motion (ROM) – Base Line

Joint	Movement	ROM
Thoraco- Lumbar	Flexion	
	extension	

5. Muscle Strength – Base Line

Muscle strength of Thoracic spine extension	MMT Scale (Oxford- Grading Scale)

6. Pain- Self- efficacy Questionnaire (PSEQ) – Baseline

Please rate how confident you are that you can do the following things at present, despite the pain. To indicate your answer tap one of the options on the scale under each item, from "not at all confident" to "completely confident".

(Fill the appropriate field only)

	0 “not at all confident”	1	2	3	4	5	6 "completely confident"
I can enjoy things, despite the pain.							
I can do most of the household chores (e.g. tidying-up, washing dishes, etc.), despite the pain.							
I can socialise with my friends or family members as often as I used to do, despite the pain.							
I can cope with my pain in most situations.							
I can do some form of work, despite the pain. ('work' includes housework, paid and unpaid work).							
I can still do many of the things I enjoy doing, such							

as hobbies or leisure activity, despite pain.							
I can cope with my pain without medication.							
I can still accomplish most of my goals in life, despite the pain.							
I can live a normal lifestyle, despite the pain.							
I can gradually become more active, despite the pain.							

5.2.2 Post Test Questionnaire

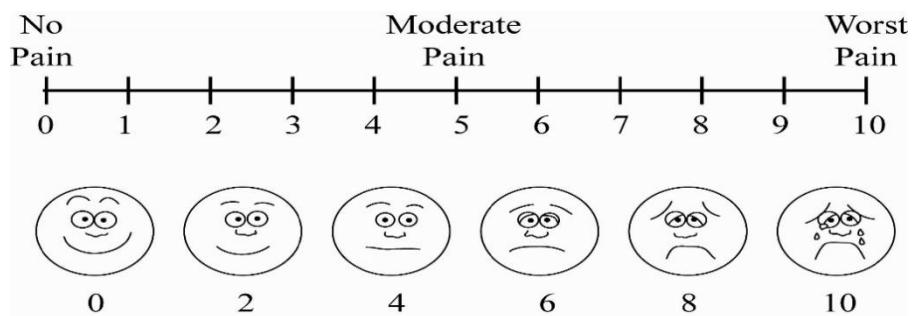
Effectiveness of Thoracic mobility exercises versus manual release technique in minimizing mechanical upper back pain among undergraduates in Sri Lanka

Post Test Questionnaire

Code No:.....

1. Pain related questions:

In the following scale, mark a number which best describes your pain. Number “0” indicates “no pain at all”, and number 10 indicates “the worst pain ever possible”. You have to denote the number which best describes your pain in following instance and please denote the number respective to each activity in the following chart



Aspect	VAS/ Pain scale number
1.1Present Pain Intensity	
1.2Sitting	
1.3forward Bending	
1.4Standing	
1.5Walking	
1.6Sleeping	
1.7Transferring	
1.8Performing day to day activities	

2. Range of Motion (ROM)

Joint	Movement	ROM
Thoraco- Lumbar	Flexion	
	extension	

5. Muscle Strength

Muscle strength of Thoracic spine extension	MMT Scale (Oxford- Grading Scale)

6. Pain- Self- efficacy Questionnaire (PSEQ)

Please rate how confident you are that you can do the following things at present, despite the pain. To indicate your answer tap one of the options on the scale under each item, from "not at all confident" to "completely confident".

(Fill the appropriate field only)

	0 “not at all confident”	1	2	3	4	5	6 "completely confident"
I can enjoy things, despite the pain.							
I can do most of the household chores (e.g.							

tidying-up, washing dishes, etc.), despite the pain.							
I can socialise with my friends or family members as often as I used to do, despite the pain.							
I can cope with my pain in most situations.							
I can do some form of work, despite the pain. ('work' includes housework, paid and unpaid work).							
I can still do many of the things I enjoy doing, such as hobbies or leisure activity, despite pain.							
I can cope with my pain without medication.							
I can still accomplish most of my goals in life, despite the pain.							
I can live a normal lifestyle, despite the pain.							
I can gradually become more active, despite the pain.							

5.3 Annex III: Treatment Protocol

Experimental Group:

Thoracic Mobility exercises

1. Cat and Camel exercise:

Subject has to position himself on their hands and knees on the floor. Head has to be in relaxed position and allowed to drop down (figure 5.3.1). First, Subject has to round his back toward the ceiling until he or she feel a nice stretch in his or her upper and middle back. When Perform this technique subject has to inhale (figure 5.3.2). Hold this stretch for 10 seconds. Then subject has to return to the starting position with flat back. While doing this subject has to exhale. Subject has to let his back sway by pressing his or stomach toward the floor (Figure 5.3.3). Hold this Position for 10 seconds. Repeat for 5 times.



Figure5.3.1



Figure 5.3.2



Figure 5.3.3

2. Horizontal Chest Expansion:

Subject has to stand shoulder width apart. Bring the hands in front of the body to the shoulder level and palm of each hand to be touched each other (parallel to the floor)(figure 5.3.4). While breathing in or inhaling bring both hands apart from each other to the side and go beyond the side of the body (Figure 5.3.5). After that, This Position has to hold for 10 seconds. Then, while exhaling hands have to return back to the normal position. Exercise has to repeat for 5 times.



Figure 5.3.4



Figure 5.3.5

3. Cross arm chest expansion:

Subject has to stand shoulder width apart. Subject has to gently cross arms, so that finger tips point to the opposite shoulder. Then, Subject has to keep the lower body stable and turn the upper body from side to side allowing with head to follow the movement. Subject has to keep the movement controlled and smooth (figure 5.3.6). Repeat 5 times.



Figure 5.3.6

Subjects has to perform these exercise two times a day. Exercise has to be performed with 5 minutes break for up to two weeks. Participants to be examined 3 times in a week whether they performed correctly.

Control Group:**Myofascial release:**

Participants will be properly placed in prone lying position and adequate
Therapist will palpate the muscle (spinal extensors) and trigger points will
be identified. Constant pressure will be applied for 90 seconds to release
the painful points as illustrated in Figure 5.3.7



Figure 5.3.7

Thoracic Spine Mobilization (Maitland technique):

Postero-anterior central vertebral pressure:

Starting position:

Subject will be positioned in prone with forehead relaxed in the back of the hands. For mobilizing upper thoracic spine (T1-T5). Therapist positioned himself to the right angle to the mobilizing surface area of the body. The pads of the thumbs are placed on the spinous process, pointing transversely across the vertebral column, and the fingers of each hand are spread out over the posterior chest wall to give stability to the thumbs. The pressure should be transmitted through the thumbs so that the interphalangeal joints are hyperextended with a slight degree of Flexion in the metacarpophalangeal joints (as illustrated in figure 5.3.8 - C).

To mobilize the mid-thoracic spine (T5–9), the physiotherapist should stand at the patient's side at the waist level with her thumbs placed longitudinally along the vertebral column so that they point towards each other. The fingers can then spread out over the posterior chest wall, to each side of the vertebral column above and below the thumbs (as illustrated in Figure 5.3.8 -A).

For the lower thoracic spine (T10–12), the physiotherapist's position depends upon the shape of the patient's chest. Either of the latter two positions described above may be used, but the essential factor is that the direction of the pressure must be at right angles to the body surface at the level (as illustrated in Figure 5.3.8 -B).

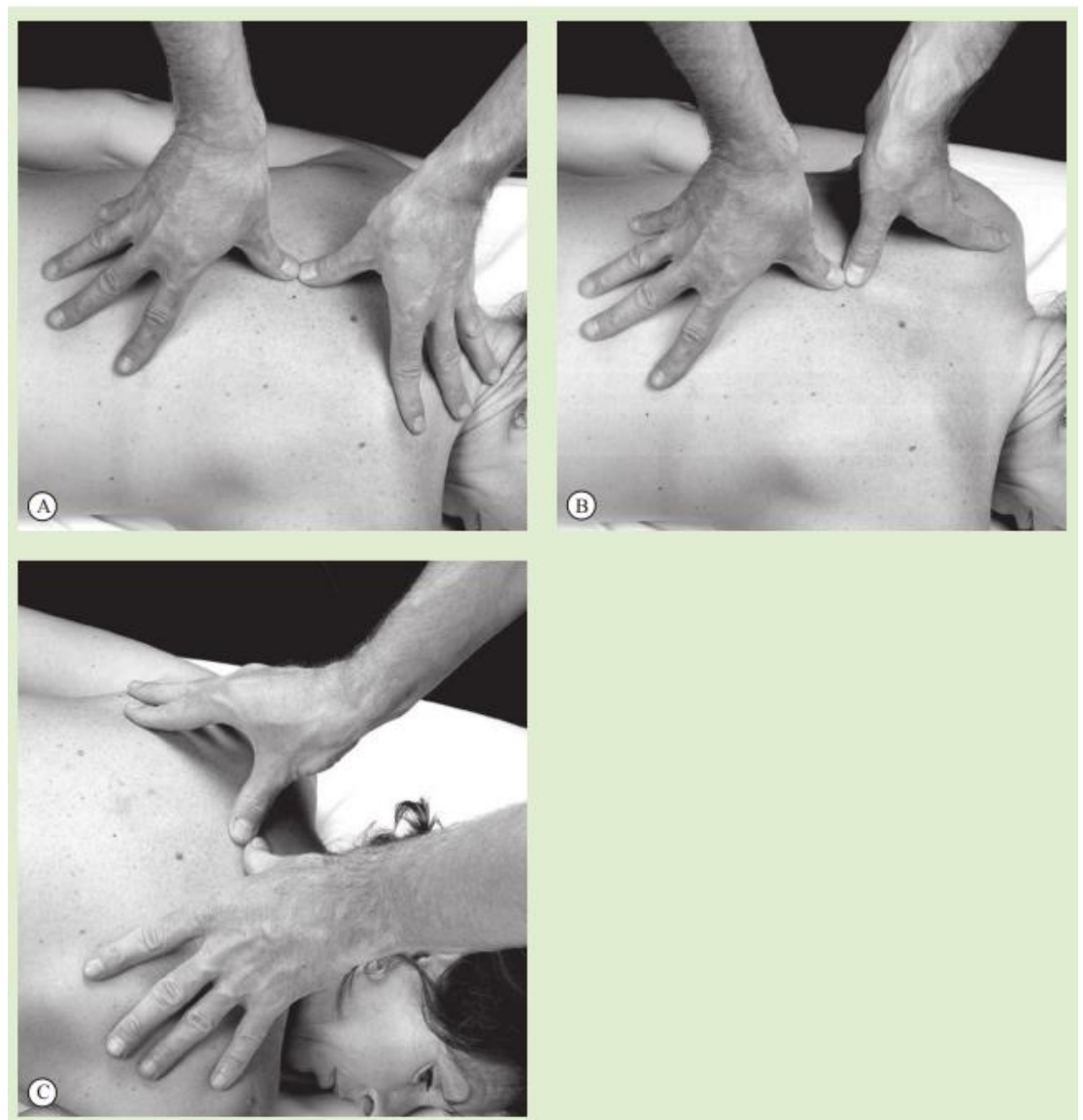



Figure 5.3.8

Method:

The mobilizing is carried out by an oscillating pressure on the spinous processes, produced by the body and transmitted through the arms to the thumbs. It is important that this pressure is applied by the body weight over the hands and not by a squeezing action with the thumbs themselves.

According to the Maitland's concept of joint mobilization technique, Grade I will be provided to improve pain, Grade II mobilization will be provided to improve pain and Range of motion and Grade III mainly applied for mainly to improve range of motion. Therefore, according to the pain intensity of the patient therapist will decide the grades (Hengeveld & Banks, 2014).

Annex : IRB Approval



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

Ref:
CRP-BHPI/IRB/10/2023/734

Date:
09/10/2023

To
Ms. Vithursha Sivakumar
M.Sc. in Rehabilitation Science
Session: 2021-2022
Student ID: 181210147
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Subject: Approval of the thesis proposal “Effectiveness of Thoracic mobility exercise versus Manual release technique in minimizing mechanical upper back pain among undergraduates in Sri Lanka [thesis]” by ethics committee.

Dear Vithursha Sivakumar,
Congratulations.
The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above mentioned dissertation, with yourself, as the principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Research Proposal
2	Questionnaire (English version)
3	Information sheet & consent form.

The purpose of the study is to find out the effectiveness thoracic mobility exercise compared with manual release technique in minimizing upper back Pain. The study involves pretest and posttest assessment using questionnaire and measuring tape to find out pain intensity, Muscle strength of upper back, Range of Motion and Disability level which will take 20 minutes as well as study involves application of Thoracic mobility exercise and manual therapy which will take 30 minutes for 3 times a week to find the effectiveness in the therapy.

There is no likelihood of any harm to the participants and / or participation in the study because both therapy will improve the upper back pain. Therefore it may benefit to the participants who will involve in the study. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 08.30 AM on 8th April, 2023 at BHPI (35th IRB Meeting) .

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This

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বাংলাদেশ হেল্থ প্রফেশন ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The Academic Institute of CRP)

CRP-BHPI/IRB/10/2023/734

Date: 09/10/2023

Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Member Secretary,
Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

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