

**THE RELATIONSHIP BETWEEN TRIGGER POINT AND MUSCLE STRENGTH IN  
DOMINANT UPPER EXTREMITY IN EXAM APPEARING UNDERGRADUATE  
PHYSIOTHERAPY STUDENTS**

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**ABSTRACT****Background and objective**

This study shows a greater prevalence of MTrPs during the exam period. Very less studies to the date has investigated the relationship between trigger points, muscle strength and stress in UG physiotherapy students. In Linton (2000) review of 11 studies discussing stress and anxiety, a significant relation was found between these parameters and neck or back pain. This is consistent with the current study's results, in which the NRS of neck pain was significantly higher during the exam period. **Aim:** To find the relationship between trigger point and muscle strength in dominant upper extremity in exam appearing undergraduate physiotherapy students. To find the relationship between trigger points and stress in exam appearing undergraduate physiotherapy students. **Material and Method:** In this correlation study 40 undergraduate physiotherapy students were taken and evaluated for trigger point in the upper trapezius muscle. The strength of each individual was taken with the help of handheld dynamometer and the sensitivity was checked using algometer. **Result:** The result showed a decrease strength with the presence of trigger point in the dominant upper extremity where else the correlation with stress and trigger was found to be insignificant. **Conclusion:**

- As per our study the correlation between trigger point and muscle strength was found to be decreased, which shows presences of trigger point decreases the strength of muscle.
- Where else the correlation between perceived stress scale and trigger was found to be insignificant.

**KEYWORDS:** Trigger Point and Muscle Strength.

**INTRODUCTION**

A myofascial trigger point (MTrP) is defined as 'A hyperirritable spot, usually within a taut band of skeletal muscle or in the muscle's fascia, that is painful on compression and that can give rise to characteristic referred pain, tenderness and autonomic phenomena.'<sup>[1]</sup>

The most hypothesized theory today is that the MTrPs are areas of sensitized lowthreshold nociceptors (free nerve endings).<sup>[1]</sup>

MTrPs are divided into two major sub-categories: active and latent.<sup>[2]</sup>

Active MTrPs are associated with spontaneous local and referred pain. They may also be associated with other symptoms such as weakness, paresthesia, or temperature changes.<sup>[3]</sup>

Latent MTrPs only evoke local or referred pain when palpated and direct pressure is applied to them.<sup>[1]</sup>

In order to positively diagnose a MTrP, at least two of the four criteria must be present, with the presence of a taut band necessary for a positive diagnosis

(Myburgh et al., 2011).<sup>[1,6]</sup>

• Four criterias:<sup>[1,3]</sup>

1. Tender spot in a taut band of skeletal muscle;
2. Patient pain recognition on tender spot palpation;
3. Referred pain pattern and
4. Local twitch response.

Electrophysiological studies have demonstrated abnormal electrical activity near MTrPs, which is described in literature as endplate noise and is associated with an increased amount of acetylcholine. This amount is not sufficient to create a muscle contraction, but might explain the taut band and the nodule in the muscle (Huguenin, 2004).<sup>[1,7]</sup>

Treaster et al. (2006) investigated the development of MTrPs during computer work and concluded that the visual stress caused during computer work increases the formation of MTrPs, especially in the trapezius muscles.<sup>[5,8]</sup>

University students preparing for exams are exposed to a wide variety of predisposing factors for MTrPs, mainly prolonged sitting, prolonged use of computers, mental concentration, reading papers and psychological stress which can result in MTrPs (Treaster et al., 2006; Hoyle et al., 2011).<sup>[1,8,9]</sup>

Various authors have also proposed that prolonged tightness or overactivity of the upper trapezius muscle can lead to middle and lower trapezius muscle weakness, resulting in postural adaptations and pain.<sup>[11,12]</sup> Although it has been suggested that individuals with neck pain may have limited strength and endurance of the lower.<sup>[4]</sup>

Additionally, textbook authors have stated that individuals with neck pain clinically exhibit limited strength or endurance of the lower trapezius muscle.<sup>[4]</sup>

Lower trapezius muscle strength has not been examined in individuals with neck pain, but there has been extensive research focusing on the relationship between neck muscle strength and neck pain.<sup>[4]</sup> Hence this study is undertaken to find the presence of trigger points in physiotherapy students undergoing exams and its relationship with muscle strength.<sup>[4]</sup>

#### AIM

To find the relationship between trigger point and muscle strength in dominant upper extremity in exam appearing undergraduate physiotherapy students.

To find the relationship between trigger points and stress in exam appearing undergraduate physiotherapy students.

#### OBJECTIVES

1. To evaluate the presence of trigger points in upper trapezius, in upper extremity in undergraduate physiotherapy students.
2. To find the strength of their upper trapezius muscle with the help of a handheld dynamometer.
3. To find the correlation between trigger points and muscle strength.
4. To find the correlation between trigger and stress in undergraduate physiotherapy students.

#### Need for Study

- Students perform long duration writing activity especially during exams.
- This activity induces stress on the muscles around the shoulder joint while maintaining the posture.
- Physical and mental stress are found to be the factors affecting trigger points

- These trigger points produce localised or referred nociceptive stimuli which might affect the function of those muscles.
- Hence this study is undertaken to find the presence of trigger points in students immediately after their exams and its relationship with the strength of the muscles.

#### Review of Literatures

##### Kalichman L and associates (2016)

Conducted a study on 39 physical therapy students to find the prevalence and sensitivity of MTrPs and forward head position (FHP) during exam period vs. mid-semester among physical therapy students their results showed higher prevalence of active MTrPs in the right Trapezius and Levator Scapula muscles, and higher prevalence of latent MTrPs in the left Sternocleidomastoides and Levator Scapulae muscles during exams, as well as a higher rate of tenderness in suboccipital musculature. Thus the conclusion was Physical therapy students show greater prevalence of MTrPs during exams. The authors recommend implementing preventative programs towards the examination period.

##### Derya celik and associates (2011)

Conducted a study on 50 subjects to investigate the relationship between LTrPs and muscle strength in healthy adults. Their result showed no significant differences in muscle strength between dominant and non dominant sides in both groups; significant differences were observed in both sides when comparison of muscle strength between 1 and 2 group, muscle strength was lower in subjects who had trigger points. Thus the conclusion was muscle strength is lower significantly in both sides in subjects who have trigger points in comparison with healthy subjects.

##### Shannon M. Petersen and associates (2011)

Conducted a study on 25 subjects to examine lower trapezius muscle strength in individuals with unilateral neck pain. Their result was significant difference in lower trapezius strength was found between sides ( $P < .001$ ), with participants demonstrating an average of 3.9 N less force on the side of neck pain. Thus the conclusion was that individuals with unilateral neck pain exhibit significantly less lower trapezius strength on the side of neck pain compared to the contralateral side. This study suggests a possible association between lower trapezius muscle weakness and neck pain.

##### Michael T. Cibulka and associates(2012)

Conducted a study on 11 subjects to assess the reliability and validity of a new MMT that assesses the entire trapezius muscle instead of the usual method of separating it into three different parts. Their result showed that the new trapezius MMT showed very high maximal voluntary isometric contraction (MVIC; 160.80%) for the upper trapezius muscle, high for the middle trapezius muscle (59.23%) and high for the lower

trapezius muscle (47.54%) when normalized against the MVICs for each individual trapezius muscle tests. Thus the conclusion was A new MMT that assesses the whole trapezius in its role as an upward scapular rotator was found to be reliable and valid.

### MATERIALS AND METHODOLOGY

The study was performed on students appeared for exams of age group 18-25 years to be selected from different years of V.S.P.M's College of Physiotherapy.

**Study Design:** Correlation study.

**Sampling Method:** Convenient sampling.

**Sample Size:** 40.

**Study Setting:** V.S.P.M's College of Physiotherapy.

**Duration of Study:** 1 year and 6 month

#### Materials to Be Used

- a) Hand held dynamometer
- b) Algometer
- c) Aquasonic gel

#### Inclusion Criteria

- Physiotherapy students.
- Age 18-25 years.
- Willing to participate in the study.

#### Exclusion Criteria

- Significant trauma.
- Infection, fracture.
- Diffuse sensory abnormality.
- Diffuse weakness.
- Significant neck, shoulder or head injury in the past three years.
- Significant scoliosis and kyphosis.

### METHODOLOGY

- Two groups were taken of 20 students each.
- First group consist of students having trigger points in upper trapezius muscles on the dominant side.
- Second group consist of students having no trigger in the upper trapezius muscles on the dominant side.
- After evaluating the trigger point, the sensitivity of trigger was checked with an Algometer and muscle strength was measured with the help of handheld dynamometer of respective muscle.

#### Trigger Point Evaluation

- All the students appearing for the exams were evaluated for trigger points. The students were evaluated individually.
- They were sitting on a chair without resting their back while foot on floor and hands resting on thigh.<sup>[3]</sup> the part to be evaluated was exposed.
- To identify a trigger point the muscles was palpated in search of a taut band.<sup>[1]</sup>
- The tip of the thumb was rubbed gently across the long axis of muscle fibres in the region of the

suspected trigger points<sup>[2]</sup> within which we looked for a nodule.<sup>[1]</sup>

- If a nodule is located, it was pressed for few seconds.<sup>[1]</sup> In the presence of trigger point there was grimacing and/or vocalization by the patient<sup>2</sup> and if none of the reaction is seen the student was asked whether the pressure evoked pain.
- On the basis of presence or absence of pain, i.e., trigger point the student were grouped in group 1 or 2 respectively.
- With the help of pressure algometer the sensitivity of trigger point was checked.<sup>[13,14]</sup>

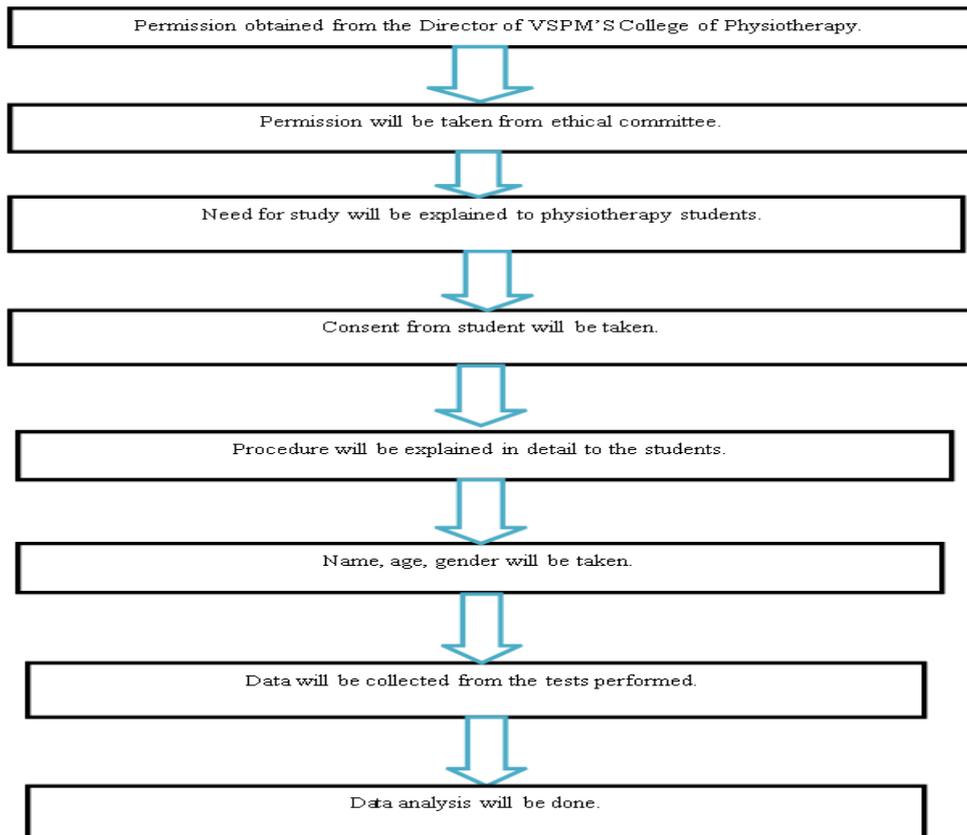
#### Muscle Strength Measurement

- Strength of the dominant upper extremity was assessed with a handheld dynamometer.
- A single practice trial was given before testing to ensure each student understood the commands.
- Each student's dominant muscle group strength was measured in the upper trapezius muscle.
- Examiner was standing on the side to be tested.

#### Upper Trapezius

- Patient Position: Prone.
- Test: Subject will be asked to elevate their shoulder, side bend their neck to the same side and rotate their head toward the opposite side.
- Placement: The dynamometer will be placed on the shoulder and pressure applied in the direction of shoulder depression and manual resistance will be given against the head in the antero lateral direction and asked to resist and maintain joint position when pressure will be applied for 5 sec.

## Procedure



## Perceived Stress Scale

For each question choose from the following alternatives

0 - never 1 - almost never 2 - sometimes 3 - fairly often 4 - very often

\_\_\_\_\_ 1. In the last month, how often have you been upset because of something that happened unexpectedly?

\_\_\_\_\_ 2. In the last month, how often have you felt that you were unable to control the important things in your life?

\_\_\_\_\_ 3. In the last month, how often have you felt nervous and stressed?

\_\_\_\_\_ 4. In the last month, how often have you felt confident about your ability to handle your personal problems?

\_\_\_\_\_ 5. In the last month, how often have you felt that things were going your way?

\_\_\_\_\_ 6. In the last month, how often have you found that you could not cope with all the things that you had to do?

\_\_\_\_\_ 7. In the last month, how often have you been able to control irritations in your life?

\_\_\_\_\_ 8. In the last month, how often have you felt that you were on top of things?

\_\_\_\_\_ 9. In the last month, how often have you been angered because of things that happened that were outside of your control?

\_\_\_\_\_ 10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

## Data analysis

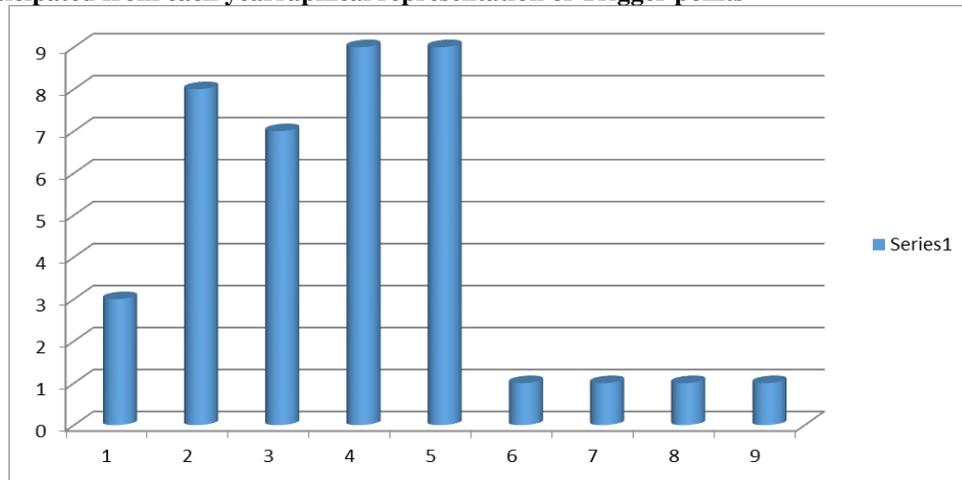
According to data collection, appropriate statistical tests/scale was applied as per the statistician

- EPI INFO STATA 10 software was used to calculate sample size.
- Statistical analysis of samples was done by using SPSS version 20.0
- Percentage were calculated and analysed by Chi Square Test.
- According to data collection, appropriate statistical tests/scale were applied as per the statistician.
- Karl's Pearson's coefficient of correlation was used to correlate:-

-Trigger points and upper trapezius strength of dominant upper extremity.

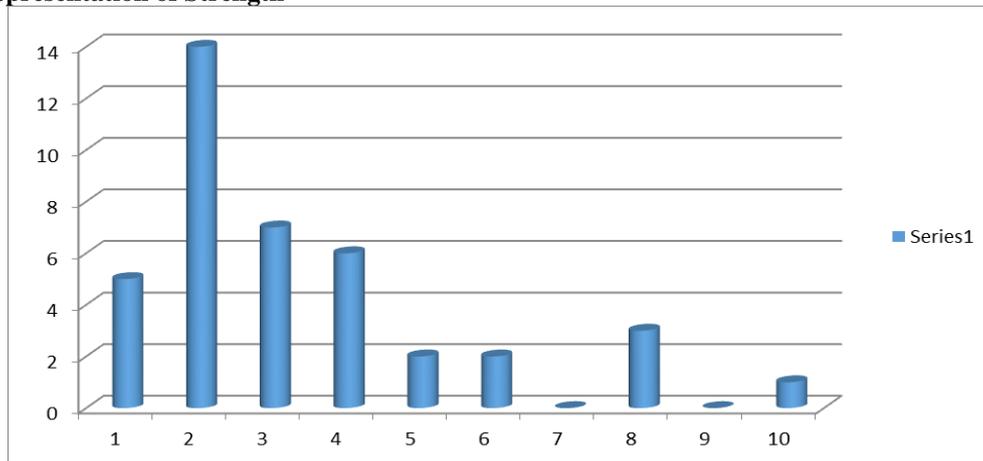
-Correlation between trigger point and perceived stress scale.

- The level of significance was obtained as 0.05.

**Graphical Representation****Students Participated from each year graphical representation of Trigger points**

X axis = No.s of subjects

Y axis = Pressure sensitivity in kgs

**Graphical representation of Strength**

X axis = strength in kgs

Y axis = no.s of subjects

**RESULT**

- The study was conducted on 40 subjects undergoing examination.
- Aged between 18-25 years.
- All subjects were females.
- All subjects were Right hand dominant
- The level of significance was obtained as 0.05.
- As per our study the correlation between trigger point and muscle strength was found to be decreased, which shows presences of trigger point decreases the strength of muscle.
- Where else the correlation between perceived stress scale and trigger was found to be insignificant.

PSS	22.175 ± 5.96	0.24
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	Average / SD	P-value
Trigger	4.44 ± 3.49	0.59
Strength	4 ± 4.26	0.240025

**APPENDICES I****Demographic Data****Date:** / /**Name:****Age:****Gender:** Male/Female**Dominance:****Height:** cm.**Weight:** Kg.**Trigger point****Muscle strength****PSS score**

Trigger (Kgs)	Strength (kgs)	pss
1.5	2	20
1.5	2	28
5	10	34
2.5	2	28
0.75	2	16
1	3	16
0.5	4	28
0.75	2	20
1.5	5	23
0.25	2	38
1.5	8	27
0.5	2	13
0.75	6	25
0.5	2	28
0.5	3	34
1	2	21
1	4	13
1	3	24
0.75	4	19
0.75	2	22
0.75	3	14
1	8	29
0.5	1	27
1.5	3	23
1.5	2	21
0.25	3	28
1.25	1	27
1	4	28
1.5	6	24
0.75	2	22
2	8	16
0.25	1	15
1.5	5	24
0.5	3	20
1.5	4	7
1	3	18
0.5	2	13
1	4	21
0.5	1	21
1	2	12

**DISCUSSION**

- The results of this study showed a greater prevalence of MTrPs during the exam period.
- Very less studies to the date has investigated the relationship between trigger points, muscle strength and stress in UG physiotherapy students.
- In Linton (2000) review of 11 studies discussing stress and anxiety, a significant relation was found between these parameters and neck or back pain.
- This is consistent with the current study's results, in which the NRS of neck pain was significantly higher during the exam period.
- Our study shows presence of trigger points decreases muscle strength.
- This study shows no significance of trigger with stress.
- With this study, the relationship of trigger point relatively decreases the strength of muscle.

**Limitations**

- The first limitation of this study is the relative lack of experience of the examiners.
- Only female subjects participated.

**CONCLUSION**

This study concludes that myofascial trigger point affects the strength of muscles of the dominant hand after prolong duration of examination where else the relationship with perceived stress scale point score was insignificant with the presence of trigger point.

**Clinical Implication**

The presence of myofascial trigger point relatively decreases the strength of muscle in dominant extremity among exam appearing under graduate physiotherapy students due to prolong sitting hours and inappropriate posture while studying.

If adequate stretching and icing is done prior examination the risk of development of trigger is reduced. Maintenance of proper posture while studying for longer duration relatively reduces the chance of developing trigger. Hence a proper exercise and stretching helps in reducing the chance of myofascial trigger point and taut band development.

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