A STUDY ON THE EFFECTIVENESS OF FASCIAL MANIPULATION IN AMATEUR BICYCLISTS WITH SYMPTOMATIC UPPER CROSS SYNDROME

A dissertation submitted in partial fulfillment of the requirement for the degree of

MASTER OF PHYSIOTHERAPY

(ELECTIVE- SPORTS PHYSIOTHERAPY)

Submitted

To

The Tamil Nadu Dr. M.G.R. Medical University

Chennai-600032

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R.V.S. College of Physiotherapy

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INTERNAL EXAMINER

EXTERNAL EXAMINER

A dissertation submitted in partial fulfillment of the requirement for the degree of **Master of Physiotherapy - May 2019** to The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

CERTIFICATE

Certified that this is the bonafide work of Mrs. K. Indumathi of R.V.S. College of Physiotherapy, Sulur, Coimbatore, submitted in partial fulfillment of the requirements for the Master of Physiotherapy Degree course from The Tamil Nadu Dr. M.G.R. Medical University under the Registration No: 271750023

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I, thank the Almighty God for providing me the wisdom and knowledge to complete my study successfully.

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I would like to express thanks to my friends for their help to complete the study.

DECLARATION

I hereby declare and present my project work "A study on the effectiveness of fascial manipulation in amateur bicyclists with Symptomatic upper cross syndrome". The outcome of original research work under taken and carried out by me under the guidance of Mr. G. S. Thirumoorthi., M.P.T Associate Professor, R.V.S. College of Physiotherapy, Sulur, Coimbatore, Tamilnadu.

I also declare that the material of this project has not formed in anyway the basis for the award of any other degree previously from The Tamil Nadu Dr. M.G.R. Medical University, Chennai.

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CONTENTS

LIST OF TABLES

LIST OF FIGURES

Introduction

CHAPTER-I

INTRODUCTION

Upper cross syndrome is becoming more prevalent in today's population. It develops because of imbalances among muscles and its motor control. The term upper crossed syndrome was coined by **Dr. Vladimir Janda(1988)**.

The upper cross syndrome is defined as tightness of the upper trapezius, pectoralis major, and levator scapulae and weakness of the rhomboids, serratus anterior, middle and lower trapezius, and the deep neck flexors (Rectus Capitus Anterior, Rectus Capitus Lateralis, Longus Capitus, Longus Colli) and the scalene muscles. Janda named this syndrome ‘‘**Upper Crossed**’’ because when the weakened and shortened muscles are connected in the upper body, they form a cross. (**Umashankar Mohanty - 2015**)

Upper-cross syndrome (UCS) is also referred to as proximal or shoulder girdle crossed syndrome (**Vladimir Janda 1988**). In UCS, tightness of the upper trapezius and levator scapula on the dorsal side crosses with tightness of the pectoralis major and minor. Weakness of the deep cervical flexors ventrally crosses with weakness of the middle and lower trapezius. This pattern of imbalance creates joint dysfunction, particularly at the atlanto-occipital joint, C4-C5 segment, cervicothoracic joint, glenohumeral joint, and T4-T5 segment. Janda noted that these focal areas of stress within the spine correspond to transitional zones in which neighboring vertebrae change in morphology.

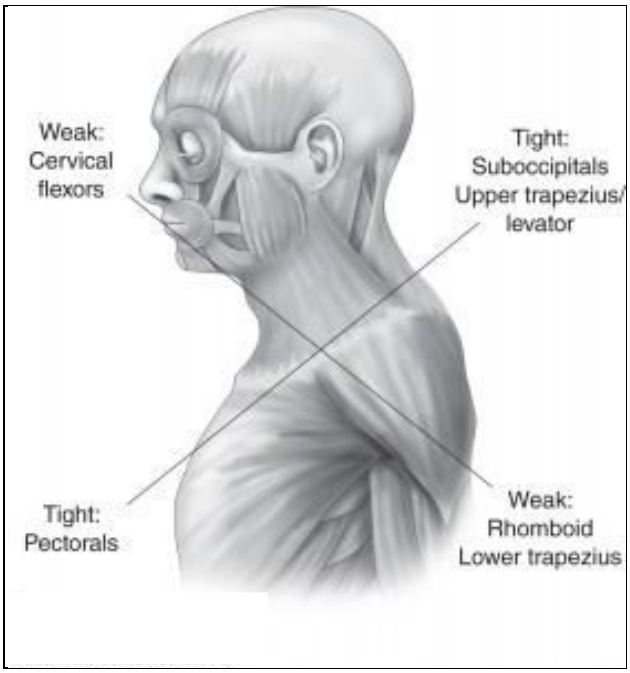

Figure 1: Upper cross syndrome

Symptoms of Upper Cross Syndrome

- Headache
- Neck pain
- Strain in the back of the neck
- Pain in the upper back, especially the shoulders
- Sore shoulder blades
- Pain in the jaws
- Tiredness
- Difficulty sitting, reading, and watching tv
- Difficulty in driving for longer period
- Restricted range of motion in the neck or shoulders

- Numbness, tingling, and pain in the upper arms
- Lower back pain (**Jennifer Huizen Aug, 2017**)

Pathomechanics of Upper cross syndrome:

Upper Cross Syndrome is characterized by postural dysfunction of protracted scapula, Medially rotated Humeri, hyperkypotic (flexed) upper thoracic spine and a protracted head with extended cervical spine. This atypical posture produces overstress of the cervico-cranial junction, the C4-5 and T4 segments, and the shoulder due to altered motion of the gleno-humeral joint. Excessive stress on the T4 segment can occasionally cause chest pain of pseudoangina pectoris. The change of direction of the axis of the glenoid fossa will cause rotation and abduction of the shoulder blades. This will cause the levator scapulae and the upper trapezius to have additional muscle activity to stabilize the head of the humerus. (**Lewit, K. 1991**) This will be accompanied by increased and constant activity of the supraspinatus, causing early degeneration of the muscle. [**Vladimir Janda, 1988**] (**Kendall F, McCreary E, et. al.2005**). Also these postural changes decrease gleno-humeral stability as the glenoid fossa becomes more vertical due to serratus anterior weakness leading to abduction, rotation, and winging of the scapulae. This loss of stability requires the levator scapulae and upper trapezius to increase activation to maintain glenohumeral centration (**Vladimir Janda 1988**). This leads to impingement syndromes & cervical / upper thoracic complaints. Typically, muscles overused in a certain direction will become tighter and shorter an effect known as **adaptive shortening**, Opposing muscles to repetitive movements sustain stretches during prolonged postures. As a result, these muscles will tend to become longer and weaker an effect known as **stretch weakness (Dolphus Thacker et al. 2011**)

Motions with difficulty

Retraction of scapula, Lateral rotation of arm, Extension of upper thoracic spine and Retraction of head (**www.learnmuscles.com)**

Aetiology:

The main cause for symptomatic upper cross syndrome is chronically adapted poor posture due to nature of work/habit, Stress, Myofascial pain syndrome and Fibromyalgia

Prevalence of symptomatic Upper Cross syndrome in amateur bicyclists

Overuse injuries are common in cyclists because of body's positioning in riding. Several studies have demonstrated that neck and back injuries are the most common overuse injuries evaluated following 6 to 8 day distance bicycle tours. **Wilber et al.1995,** found that 44.2% male and 54.9% of female recreational cyclists presented for medical treatment of neck pain.

Weiss et al, 1985. also reported that 66.4% of recreational cyclists reported neck and shoulder symptoms following a 8-day, 500 mile bicycling tour. The prevalence of such injuries, especially in recreational cyclists, suggests that more understanding is needed by riders and their health care providers to prevent such injuries by proper biomechanics, pre-existing musculoskeletal dysfunction corrections and an awareness to properly treat these injuries followed by rehabilitation in order to avoid recurrences and further complications.

Assessment of Upper Cross syndrome

Sagittal and coronal plane observation, Palpation for over facilitated and over inhibited muscles for soreness and pain. There is various assessment tools used to evaluate pain and disabilities caused by Upper Cross Syndrome related musculoskeletal imbalances . Such as Visual Analogue Scale, Numeric Pain Rating Scale, Neck Disability Index, Northwick Park Questionnaire(NPQ), Disabilities of Arm Shoulder and Hand questionnaire(DASH).

Visual analogue scale consists of 10 cm horizontal line with 2 end points, labeled no pain and worst pain respectively. The patient is requested to place a mark on the 10 cm line to know his pain intensity at that particular time (presently feeling). The distance in cm from lower end of VAS to the patients mark is used as a numerical index of the severity of pain. **(Katz J, Melzack R, 2013)**

Neck disability index is a patient completed, condition specific functional status questionnaire with 10 items including pain, personal care, lifting, readings, headache, concentration, work, driving, sleeping and recreations. NDI has a sufficient support and usefulness to retain its current status as most commonly used self-report measure for neck pain. Each section is scored on a 0 to 5 rating scale, in which 0 means NO PAIN, 5 mean WORST IMAGINABLE PAIN..

Role of fascia:

Fascia is the soft tissue component of the connective tissue system that permeates the human body. The one important connective tissue structure which is considered as an essential part in manual therapy causing many dysfunctional syndromes is Fascia.

Craig E. Morris et al, (2015) in a study of the fascial involvement on the torsional Upper Cross Syndrome, has explained the fascial tissue in emphasizing its anatomic compartmental and binding role, also the load transfer, sensory and kinetic chain function. This study strongly correlates the fascial involvement in dysfunctions and imbalances in posture.

Biomechanical model

In order to analyze the fascial system more effectively, Stecco divides body into 14 functional segments such as Head, Neck, Scapulae, Thorax, Lumbar, Pelvi, Hip, Knee, Ankle, Foot, Arm, Elbow, Wrist and Digits.

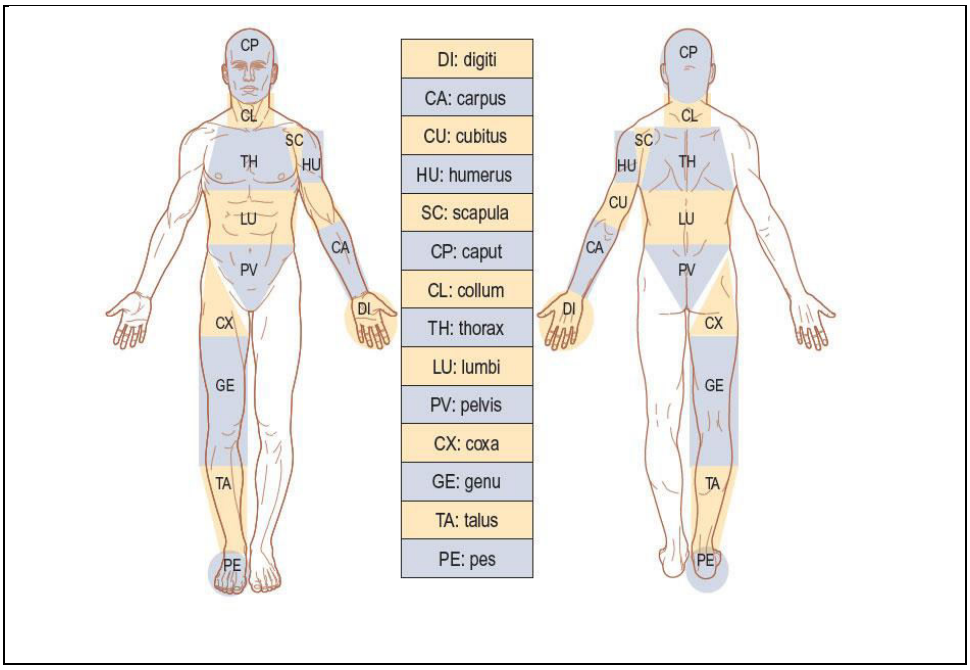

Figure 2: The FM Biomechanical model- Segments

Each functional segment is comprised of a combination of portions of muscles, their fascia and joint components.

Each Myofascial unit(MFU) has a Center of Perception (CP), where movement occurring at the joint is perceived. A CP can become painful if, the unidirectional forces of the MFU are not synchronized also if mechanoreceptors in the capsule, ligaments and tendons are subjected aberrant forces. This biomechanical model allows a clinician to go beyond site of pain (centre of perception) and to trace back its fascial origin in corresponding key areas (CC's & CF's)

Significance of Fascial Manipulation in treating Musculoskeletal pain

Fascia is well innervated structure in human body.(**Stecco et al. 2007**) It is distributed with Myelinated axons, Muscle spindles, Free nerve endings, Myofibroblasts, Elastic fibres, Collagen and Fibroblasts, Ruffini corpuscles and Pacini corpuscles. Hence it is one of the predominant pain producing structure in dysfunctional states. Fascia plays an essential role in motor control of coordinated movements. So Fascial Manipulation is considered to alter the level and extent of pain, proprioception, mechanotransduction and coordinated ROM between joint complexes. (**Julie Ann Day et al, 2017**)

Fascial Manipulation in symptomatic Upper Cross Syndrome

There are a number of previous studies on improving Upper Cross Syndrome. **Yang et al.(2007)** conducted a study on the effects of sling exercise on muscle tension and pain in subjects with Upper Cross Syndrome. **Dolphus Thacker et al.(2011)** conducted a study on effect of Active release Technique in Upper Cross Syndrome. **Uma Shankar Mohanty et al.(2015)** researched effectiveness of Muscle Energy Technique in Upper Cross Syndrome. However, there is a lack of research on the effects of Fascial Manipulation in Upper Cross Syndrome. Hence, this study aims to identify changes in pain and functional ability followed by Fascial manipulation and to provide basic data of

the effects of the same. **Craig E. Morris et al, (2015)** in a study of the fascial involvement on the torsional Upper Crossed Syndrome which is a multi planar postural dysfunction rather Janda's sagittal plane variant, has explained the fascial tissue in emphasizing its anatomic compartmental and binding role, also the load transfer, sensory and kinetic chain function. The authors introduce the Mid-Pectoral Fascial Lesion (MPFL) as a myofascial disorder. This study describes that resolving Fascial adhesions or lesions was found to be an effective therapeutic approach in treating Multi planar Upper Cross Syndrome.

Statement of the study:

The study is done to evaluate the efficacy of Fascial Manipulation in pain and neck functional capabilities among amateur bicyclists with symptomatic Upper Cross Syndrome.

Objective:

1. To experiment the efficacy of Fascial Manipulation on pain among patients who are amateur bicyclists with symptomatic Upper Cross Syndrome.
2. To experiment the efficacy of Fascial Manipulation in neck function in patients who are amateur bicyclists with symptomatic Upper Cross Syndrome.

Need of the study:

This study is aimed to provide the efficacy of Fascial Manipulation in amateur bicyclists with symptomatic Upper Cross syndrome. It is to experiment and justify the

effects of Fascial Manipulation in amateur bicyclists with symptomatic Upper Cross Syndrome.

Hypothesis:

1. It is hypothesized that there may be significant difference in pain following Fascial Manipulation in pain scale
2. It is hypothesized that there may be significant difference in neck functional ability following Fascial Manipulation in Neck Disability Index
3. It is hypothesized that there may not be significant difference following Fascial Manipulation in Pain Scale and Neck Disability Index.

Operational Definitions

Pain:

It is defined as an unpleasant sensory and emotional experience arising from actual potential tissue damage or described in terms of such damage. **(Readyard and Edwards, 1992)**

Upper Cross Syndrome:

The upper cross syndrome is defined as tightness of the upper trapezius, pectoralis major, and levator scapulae and weakness of the rhomboids, serratus anterior, middle and lower trapezius, and the deep neck flexors, especially the scalene muscles. Janda named this syndrome “Upper Crossed” because when the weakened and shortened muscles are connected in the upper body, they form a cross.

Fascial Manipulation:

A manual approach to treat fascial dysfunction through deep friction method over particular key points of fascia is called fascial manipulation.

Review of Literature

CHAPTER – II

REVIEW OF LITERATURE

Section A: Studies related to the Upper Cross Syndrome and its prevalence of in Amateur bicyclists

Section B: Studies related to the effect of Fascial Manipulation

Section C: Studies related to the reliability and validity of VAS

Section D: Studies related to reliability on Neck Disability Index.

Section A: Studies related to the Upper Cross Syndrome and its prevalence of in Amateur bicyclists

1. **Michele K. Moore, DC(2004)** in a study states in the management of Upper cross syndrome and cervicogenic headache analyzing the muscle imbalances through sagital and coronal plane analysis along with movement and vertebral components dysfunctions when treated with combination of chiropractic adjustments, interferential therapy, trigger point massage, exercise, and alteration of activities of daily living as **Vladimir Janda, Christiansen, Murphy, Liebensen,** and **Harrison** have researched the use of corrective exercise to treat muscular imbalance, relieved from symptoms of Upper Cross Syndrome such as chronic headaches and neck pain.

2. **A van der Walt et al (2014),** in a study of Non-traumatic injury profile of amateur cyclists stating that the study was conducted to determine the incidence of overuse injuries in amateur cyclists preparing for participation in a 1-day cycle challenge. Of the 3300 respondents, 75% were male and 59% were between 30 and 50 years old. Non-traumatic injury, pain or neurological symptoms were reported by 88% of the respondents. The percentages of all respondents who experienced problems in the following anatomical areas were as follows: neck 34%, back 41%, hand/wrist 41%, buttock/perineum 41%, hip 7%, knee 33% and foot/ankle 24%. Non-traumatic injuries, pain not due to trauma and neurological symptoms are common in amateur cyclists training for a 1-day cycle challenge. Back pain, hand/wrist symptoms and buttock/perineal pain or numbness were the most common problems cyclists experienced, followed by neck pain, knee pain, foot/ankle problems and, lastly, hip problems. Hence one third population of amateur cyclists were prevalent in experiencing neck problem which is due to the prolonged upper cross posture further studies are indicated based on outcomes.
3. **Nathan J. Dettori & Daniel C. Norvell (2006),** in a study of non-traumatic bicycle injuries presenting that the prevalence of non-traumatic bicycle injuries can be as high as 85%. The most common sites for non-traumatic cycling-related injuries include the knee, neck/shoulder, hands, buttock and perineum. Injury prevention strategies have been proposed to reduce non-traumatic injuries but these strategies remain untested. One of the main strategy in preventing non-traumatic sports injuries is correcting muscle imbalances before events.

Section B: Studies related to the effect Fascial Manipulation

1. **Craig E. Morris et al, (2015)** in a study of the fascial involvement on the torsional Upper Crossed Syndrome, has explained the fascial tissue in emphasizing its anatomic compartmental and binding role, also the load transfer, sensory and kinetic chain function. The authors introduce the Mid-Pectoral Fascial Lesion (MPFL) as a myofascial disorder, describing 11 ipsilateral chest wall cases. While managing these cases, the authors encountered and subsequently designated the Torsional Upper Crossed Syndrome (TUCS) as a multi-planar addition to Janda's classic sagittal plane model. This article integrates published updates regarding the role of posture and fascia with the effects of chest wall trauma and a newly described associated postural syndrome as illustrated with this case series. It is described that resolving Fascial adhesions or lesions was found to be an effective therapeutic approach in treating Multi planar Upper Cross Syndrome
2. **Antonio Stecco et al, 2015,** in a research on Fascial Disorders and Implications for its Treatment, denotes that : In the past 15 years, multiple articles have appeared that target fascia as an important component of treatment in the field of physical medicine and rehabilitation. Dysfunction involving alterations in mechanical coordination, proprioception, balance, myofascial pain, and cramps are more related to deep fascia and the epimysium. . The deep fasciae and the epymisium require treatment that generates enough pressure to reach the surface of muscles. For this reason, the use of small surface tools and manual deep friction with the knuckles or elbows are indicated.

Section C: Studies related to the reliability and validity of VAS

1. **Young Jun Shin et al, (2017)** conducted a study to experiment Correlations among visual analogue scale, neck disability index, shoulder joint range of motion, and muscle strength in young women with forward head posture. This study was carried out on 42 female college students. The neck pain and disability index for each subject was measured using VAS and NDI, respectively. Shoulder joint ROM and muscle strengths of the subjects using a goniometer and a dynamometer done, respectively. External rotation, internal rotation, and abduction of the shoulder joint were measured for each subject. A significant negative correlation between neck pain and shoulder joint ROM in external rotation and the muscle strength of the shoulder joint in abduction was found in the subjects. In addition, a significant positive correlation was observed between ROM in external rotation and muscle strength in abduction. This study showed a significant negative correlation between neck pain and ROM in external rotation as well as between neck pain and the muscle strength in abduction. Hence increased values in VAS correlates proportionately reduced values with ROM in pre and post treatment assessments, it is suggested to that in studies on postural conditions VAS can be effectively implied as an assessment tool.
2. **Mirco Branchini (2016)**, while experimenting a study which aimed at comparing the effectiveness of Fascial Manipulation® associated with a physiotherapy program for Chronic postural pain compared to a physiotherapy program alone applied VAS as an assessment tool along with and the brief pain inventory (BPI), function with the Rolland-Morris disability questionnaire (RMDQ), state of well-being with the short-form 36 health-survey (SF-36). 24 subjects were randomized

into two groups, both received eight treatments over 4 weeks. Outcomes were measured at baseline, at the end of therapy and at a 1 month and a 3 months follow-up. Pain was measured with the visual analogue scale (VAS) and the brief pain inventory (BPI), function with the Rolland-Morris disability questionnaire (RMDQ), state of well-being with the short-form 36 health-survey (SF-36). The mean clinical important difference (MCID) was also measured. The study concluded Visual analogue scale is an effective tool and having linear relationship with brief pain inventory (BPI), function with the Rolland-Morris disability questionnaire in assessing effectiveness of fascial manipulation.

3. **Boonstra AM et al (2008),** Carried out a study to determine the reliability and validity of the VAS for disability in patients with chronic musculoskeletal pain and they concluded that reliability of the VAS for disability is moderate to good and a strong correlation with the VAS for pain.
4. **Jason S Schliesser,et al (2003).** Conducted an study on effect of manual therapy for cervical pain. In this, they included 39 patients. The VAS was used to objectively quantify pain. This study revealed a statistically significant reduction in pain as quantified by visual analogue scores.

Section D: Studies related to reliability on Neck Disability Index.

1. **Manuel saavedra-hernandez (2013)** reported reliability and validity of neck index disability as a single instrument measuring in mechanical neck pain patients for the reliability study a cross section design was used the study population consisted of 93 patients aged between 35 to 55 years the main outcome measure neck index disability and numerical pain rating scale as in this study the absolute

type of neck index disability seems to be less sensitive to bias than comparative one and is therefore preferable for general use.

2. **Vernon h, mior s.(1991),**Conducted a study of reliability and validity of the neck disability index: their questionnaires completed by 52 such subjects resulting in a total index alpha of 0.80, with all items having individual alpha scores above 0.75. Concurrent validity was assessed in two ways. First, on a smaller subset of 10 patients who completed a course of conservative care, the percentage of change on NDI scores before and after treatment was compared to visual analogue scale scores of percent of perceived improvement in activity levels. These scores correlated at 0.60. Secondly, in a larger subset of 30 subjects, NDI scores were compared to scores on the McGill pain questionnaire, with similar moderately high correlations (0.69-0.70). While the sample size of some of the analyses is somewhat small, this study demonstrated that the NDI achieved a high degree of reliability and internal consistency

Methodology

CHAPTER – III

METHODOLOGY

10 Subjects who are recreational bicyclists with Upper cross syndrome with symptoms of neck, shoulder and/or arm pain were recruited from various places of the city through snowball referral sampling. Signed consent from the participants obtained on a purely voluntary basis. Out of 10 subjects 7 males and 3 females, mean age 26 years. Subjects were informed about every single treatment method and the modes of evaluation.

3.1.1. Study Setting

The study was conducted in the Physiotherapy out-patient department of RVS college of Physiotherapy, Sulur, Coimbatore

3.2.1. Selection of subjects

Ten Patients were randomly selected who fulfilled the inclusion and exclusion criteria.

3.2.2. Variables

3.2.2.1.Dependent variables

- Pain
- Neck Disability

3.2.2.2.Independent variable

- Fascial Manipulation

3.2.3. Measurement tools

Variable	Tools
Pain	Visual Analogue Scale (VAS)
Neck Disability	Neck Disability Index (NDI)

3.3. Study Design

The study design used was a pre-test and post-test experimental design.

3.4. Inclusion criteria:

- Clinically Patients diagnosed with Upper Cross Syndrome
- Both genders
- Age group of 18 to 30 years
- Amateur bicyclists who ride bicycle weekly atleast 5 to 8 hours
- Any profession
- With or without radiating pain in upper extremities
- Any duration of symptoms

3.5.Exclusion criteria:

- Cervical instability
- Cord compression
- Spinal tumors
- Spinal infections
- Debilitating Cardio vascular diseases
- Severe osteoporosis

- Cervical myelopathy
- Ligamentous instability
- Vertebral artery insufficiency
- Patients on Anelgesics
- Patients on Anti-inflammatory drugs
- Ankylosing Spondylitis
- Spondylo-arthropathy
- Altered Sensorium

3.6. Orientation to the patient:

Before the collection of data, all the subjects were explained about the purpose of the study. The investigator had given a detailed orientation about outcome measurement. The concern and full cooperation of each participant was sought after complete explanation of the condition and demonstration of the procedure involved in the study.

3.7. Materials used:

- Data Collection Sheet
- Patient Consent Form
- Visual Analogue Scale
- Neck Disability Index
- Fascial Manipulation Assessment chart
- Pillow
- Couch

3.10. Test administration

a. Pain assessed by visual analogue scale

No Pain **Moderate pain** **Worst Pain**

The visual analogue scale is a subjective measure of pain. It consists of 10cm line with two end-points respecting ‘on pain’ and ‘worst pain imaginable’. During the visit, patients are asked to rate by marking on the line corresponding to their current level of pain.

b. Neck disability is assessed by neck disability index :

It is a patient – completed, condition – specific functional status questionnaire with 10 items including pain, personal care, lifting, readings, head-ache, concentration, work, driving, sleeping and recreations. NDI has a sufficient support and usefulness to retain its current status as most commonly used self report measure for neck pain.

Each section is scored on a 0 to 5 rating scale, in which 0 means NO PAIN, 5 means WORST IMAGINABLE PAIN.

Mean duration of the test is about 3 to 7.8 minutes.

Measures are:

- 0-4points (0 – 8 %) NO DISABILITY
- 5-14 points (10-28%) MILD DISABILITY
- 15-24 points (30-48%)MODERATE DISABILITY
- 25-34points (50-64%)SEVERE DISABILITY
- 35-50 points (70-100%)COMPLETE DISABILITY

3.11. Treatment procedure:

A systematic evaluative process conducted to find the of fascial alterations in the key points of selected treatment segments. Changes in range of movement, pain, and/or muscle recruitment were verified. Identification of altered tissue thickness or densifications was done among head, neck and thorax.

After Palpation verification assessment for densified fascial points (CC's/ CF's) was done for the same segments. Within deep muscular fascia of each Myofascial unit a specific small area called the **Centre of Co-ordination**(CC). It is defined as a focal point for vectorial forces proceeded by muscle fibres of an MFU often situated within the deep fascia overlying a muscle belly. There are also small areas located over retinacula that might monitor movement in intermediate directions between 2 planes known as **Centre of Fusions** (CF)

Among thorax, neck and head for this study the points taken to treat were as follows

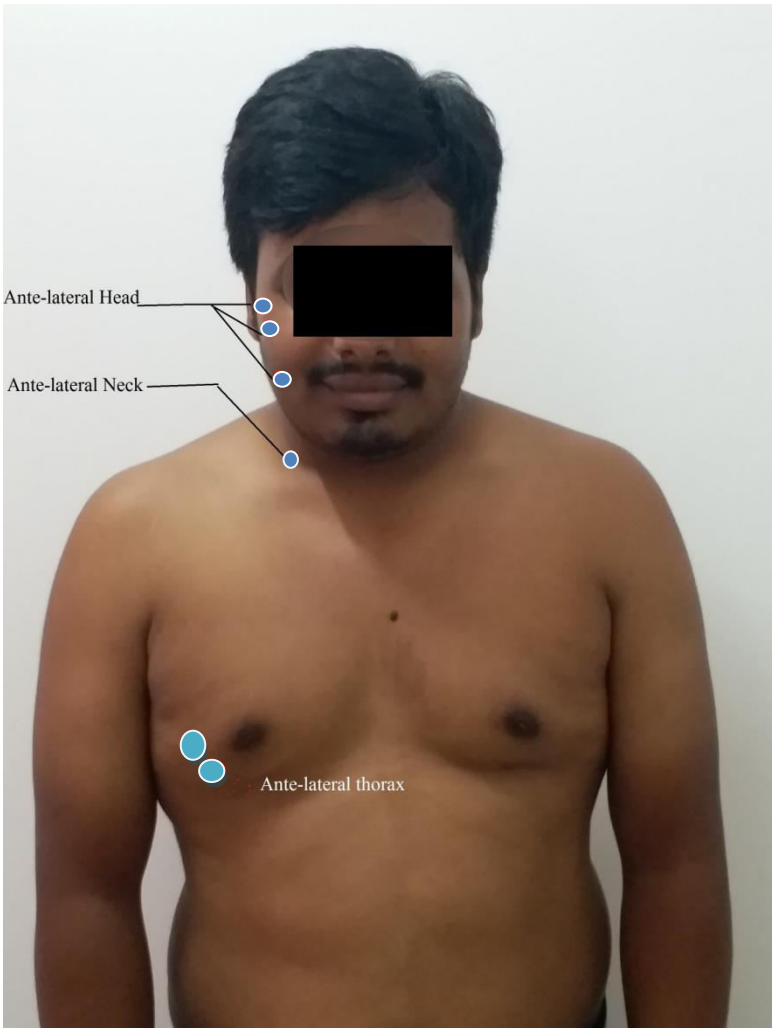

Figure 3: FM Points in Anterior aspect

During the first session Ante-Lateral points of thorax and neck were balanced with opposite side Retro-lateral points of thorax or neck (2:1) and Next consecutive session which was planned and executed in 5 days interval, Extra-rotation neck and thorax with Ante-lateral head were manipulated.

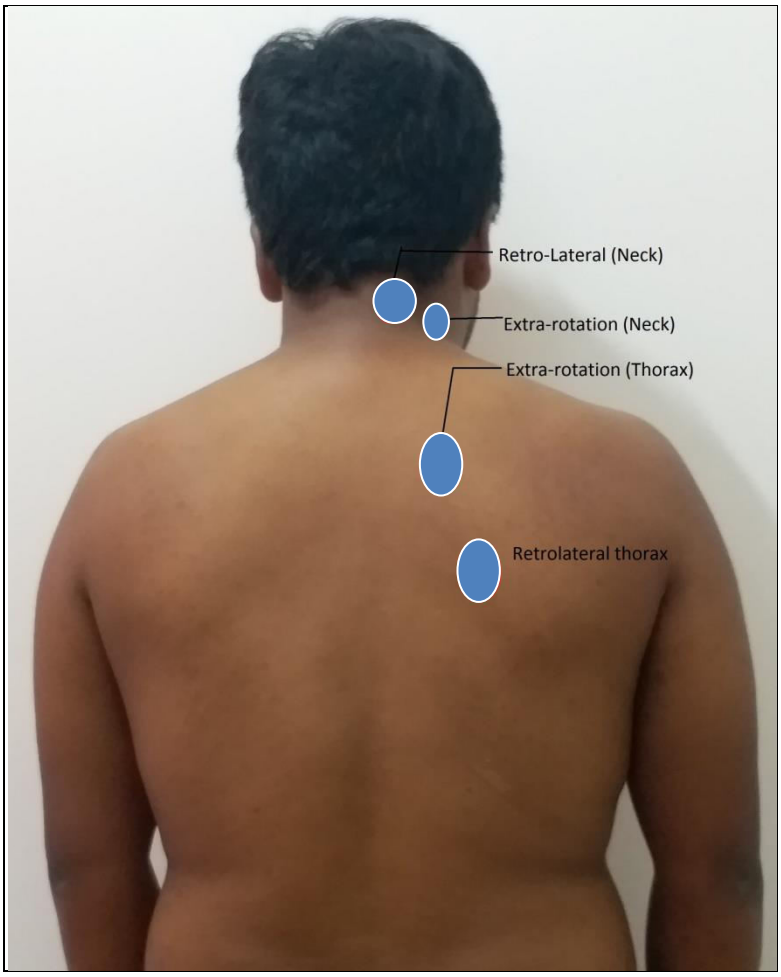

Figure 4: FM Points in Posterior aspect

Ercole Borgini et al.(2010) suggests that the time required for manipulating each point of fascial densifications were ranging from 2.20 minutes to 3.30 minutes in multidirectional strokes.

The manual technique itself is directed towards the deep muscular fascia. Knuckle, or fingertips were used over the treated points to create localized hyperemia through deep friction.

Figure 5: Fascial Manipulation to Anterolateral thorax

Patients were positioned according to the treatment area to be manipulated. With knuckle or finger tip through deep friction technique the affected densified key points were mobilized. Manipulation strokes given in all the directions of the key points. Duration of manipulating time for each point was ranging between 2.50 minutes to 3.29 minutes as per the suggestive duration to break/soften the densified Fascial tissue by **Luigi Stecco**. (**Julie Ann Day et al, 2017**). None of the previous points were mobilized during second session. All the patients were reassessed after 5 days of second treatment session. Visual Analogue scale for pain and Neck disability index for neck functional inability re-recorded and datas derived.

3.12. Collection of Data

10 Amateur Cyclists with postural Upper cross Syndrome with significant symptoms were taken for this study. Pretreatment assessment was done. All the patients were initially assessed and the baseline pain score was recorded on Visual Analogue scale and their neck functional disability was calculated using Neck Disability Index before commencing the treatment and reevaluated after 10 days where in between 2 treatment sessions of Fascial Manipulation with 5 days interval between 2 consecutive sessions for every patient was executed.

3.13. Statistical Techniques.

The Collected data were analyzed by paired ‘t’ test to find out significance between pre and post test values of experimental group.

Data Analysis & Result

CHAPTER IV

DATA ANALYSIS AND RESULTS

4.1. Data analysis:

This chapter deals with the systemic presentation of the analyzed data followed by the interpretation of the data.

a) Paired 't'test:

$$\bar{\boldsymbol{D}} = \frac{\sum \boldsymbol{D_i}}{\boldsymbol{n}}$$

$$\sigma_{diff} = \sqrt{\frac{\sum D_i^2 - (\bar{D})^2 . n}{n-1}}$$

$$\boldsymbol{t} = \frac{\bar{\boldsymbol{D}} - \boldsymbol{0}}{\sigma_{diff} . \sqrt{n}}$$

Where,

D_i — Difference between pre-test and post-test values

$\bar{D} = \frac{\sum D}{n}$ Mean difference between pre test and post test values

n - Total no. of subjects

σ_{diff}-Standard deviation

Table -1: The table shows mean value, mean difference, standard deviation, and paired‘t’ value between pre- test and post-test scores of pain among the subjects

Measurement	Mean	Mean difference	Standard deviation	Paired ‘t’ value
Pre- test	4.5	2.6	0.84	9.78
Post- test	1.9			

*0.005 level of significance

In the patients for pain the calculated paired ‘t’ value is 9.78 and ‘t’ table value is 3.250 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference in pain following Fascial Manipulation in amateur bicyclists with Upper Cross Syndrome.

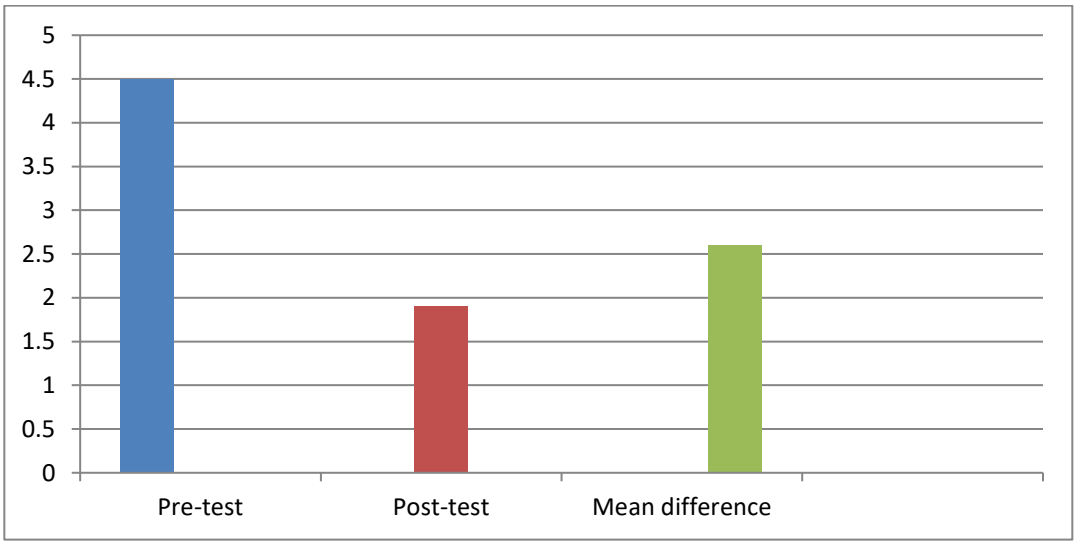

Figure 6 : shows graphical representation of pre and post- test, mean values of pain among patients

Table – 2 **It shows mean value, mean difference, standard deviation, and paired‘t’ value between pre- test and post-test scores of neck disability among patients**

Measurement	Mean	Mean difference	Standard deviation	Paired ‘t’ value
* Pre- test	43.9	18.4	0.97	59.9
0 Post- test	25.2			
.				

005 level of significance

In the patients for neck disability the calculated paired ‘t’ value is 59.9 and ‘t’ table value is 3.250 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference in pain following Fascial Manipulation in amateur bicyclists with UCS.

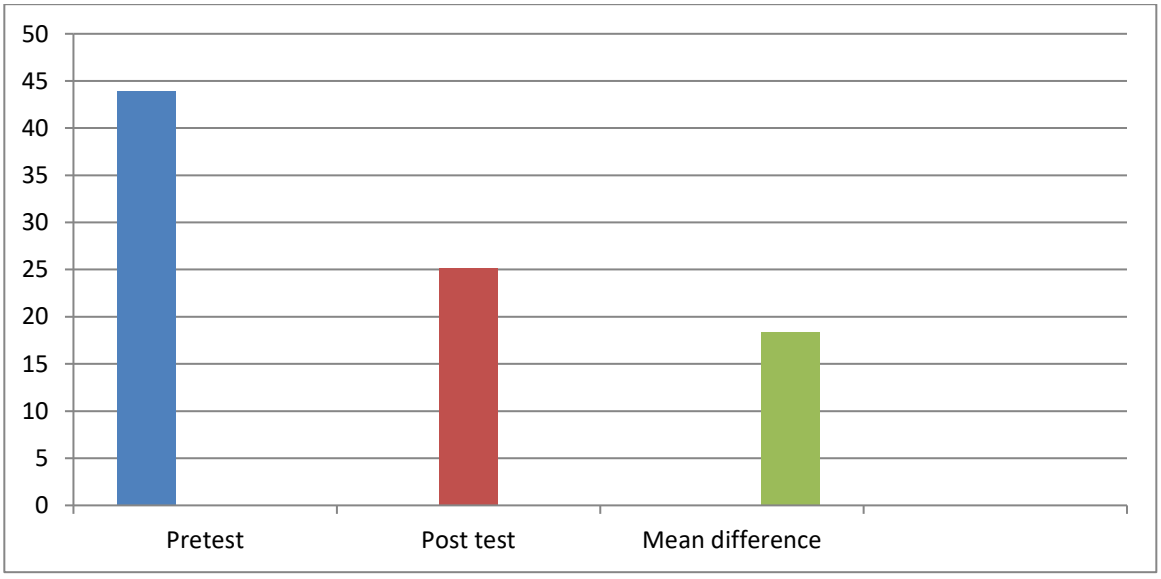

Figure 7 : shows graphical representation of pre and post- test, mean values of neck disability among patients.

4.2. Results

Ten clinically diagnosed symptomatic upper cross syndrome subjects were taken for the study and were treated with fascial manipulation for a period of ten days. Pain and neck disability index were measured before intervention and after two sessions of fascial manipulation with 5 days interval.

Analysis of dependent variable pain in patients:

In the patients for pain the calculated paired ‘t’ value is 9.78 and ‘t’ table value is 3.250 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference in pain following Fascial Manipulation in amateur bicyclists with Upper Cross Syndrome.

Analysis of dependent variable Neck Disability Index in patients:

In the patients for neck disability the calculated paired ‘t’ value is 59.9 and ‘t’ table value is 3.250 at 0.005 level. Since the calculated ‘t’ value is more than ‘t’ table value, it shows that there is significant difference in pain following Fascial Manipulation in amateur bicyclists with UCS.

Discussion

CHAPTER V

DISCUSSION

The study was conducted on 10 subjects aimed to discover the effectiveness of Fascial Manipulation in amateur bicyclists with symptomatic Upper Cross Syndrome.

The effectiveness of Fascial Manipulation was earlier experimented by various Physiotherapists in various studies on postural dysfunctions. **Vilma cosic, Juile Ann Day, Pietro Iogna, Antonio stecco (2014)** have concluded that Fascial manipulation is effective in treating postural conditions such as hyper-kyphosis in pubescent subjects.

In a study on fascial disorders by **Antonio Stecco et al(2015)**. it is discovered that dysfunctions involving alterations in mechanical coordination, proprioception, myofascial pain and cramps are more related to fascia and the epimysium. Hence deep friction with elbows or knuckles which manipulates deep fascial system where dysfunctions occurs, prove significant improvement in the above mentioned dysfunctions.

Hence in this experimental study fascial manipulation proves it creates significant improvement in scale of pain and neck disability in the patient population. Hence

Conclusion

CHAPTER VI

CONCLUSION

The study was conducted on 10 subjects aimed to discover the effectiveness of Fascial Manipulation in amateur bicyclists with symptomatic Upper Cross Syndrome.

It was proceeded with 2 sessions of Fascial Manipulation in 5 days interval. Pre and post treatment values calculated with VAS and Neck disability index score and from the results it can be concluded that there is significant difference in reduction of pain and neck disability in the patient population.

6.1 Limitations

- Number of subjects was small
- Only 2 treatment sessions were conducted
- Post treatment exercise regimens were not designed
- Long term effects of short duration treatment sessions could not be predicted
- Psychological factors were not considered
- Short term study

6.2 Suggestions

- Similar study can be carried out for larger sample size.
- Study can also be carried out for different age groups.
- The study can be carried out for a long term period
- This study can be compared with any other treatment techniques

- More assessment and treatment segments to the considered.
- Precise inclusion and exclusion criteria can be derived with sample selections.
- Previous trauma and surgical history to be valued.
- Time line injuries in the past to be taken into consideration

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CHAPTER VII

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Annexure

CHAPTER VIII

ANNEXURE I

PHYSIOTHERAPY ASSESMENT CHART

Subjective assessment

Name Age Sex

Occupation

Chief complaints

Medical history

Associated problems

Pain assessment

Site of pain

Type of pain

Duration of pain

Nature of pain

Relieving factors

Others if any

Objective assessment

Built

Posture

Skin changes

Bony and soft tissue counters

Attitude of limb

Muscle wasting

Skin changes

Edema

Gait

Deformity

On palpation

Tenderness

Swelling

Muscle spasm and Trigger points

Warmth

Other if any

On examination

Range of motion for neck

Table -3

MOVEMENTS	**AROM**	**PROM**
Flexion		
Extension		
Side flexion		
Rotation		

ANNEXURE II

Pre and post test VAS

Table-4

SL.NO	PRE TEST	POST TEST
1	6	2
2	5	3
3	5	2
4	7	3
5	4	2
6	3	1
7	5	2
8	3	1
9	3	1
10	4	2

ANNEXURE III

Pre and post test NDI

Table - 5

SL.NO	PRE TEST	POST TEST
1	50	32
2	48	28
3	46	28
4	55	36
5	40	22
6	36	18
7	46	28
8	38	18
9	38	21
10	42	24

ANNEXURE – IV

PATIENT CONSENT FORM

I …… voluntarily consent to participate in the research named on **"AN EXPERIMENTAL STUDY ON THE EFFECTS OF FASCIAL MANIPULATION IN AMATEUR BICYCLISTS WITH SYMPTOMATIC UPPER CROSS SYNDROME ''**

The researcher has explained me the treatment approach in brief, risk of participation and has answered the questions related to the study to my satisfaction.

Signature of patient _____

Signature of researcher _____

Signature of witness _____

Place:

Date:

ANNEXURE – V

Neck Disability Index

This questionnaire has been designed to give us information as to how your neck pain has affected your ability to manage in everyday life. Please answer every section and **mark in each section only the one box that applies to you**. We realise you may consider that two or more statements in any one section relate to you, but please just mark the box that most closely describes your problem.

Section 1: Pain Intensity

- ☐ I have no pain at the moment
- ☐ The pain is very mild at the moment
- ☐ The pain is moderate at the moment
- ☐ The pain is fairly severe at the moment
- ☐ The pain is very severe at the moment
- ☐ The pain is the worst imaginable at the moment

Section 2: Personal Care (Washing, Dressing, etc.)

- ☐ I can look after myself normally without causing extra pain
- ☐ I can look after myself normally but it causes extra pain
- ☐ It is painful to look after myself and I am slow and careful
- ☐ I need some help but can manage most of my personal care
- ☐ I need help every day in most aspects of self care
- ☐ I do not get dressed, I wash with difficulty and stay in bed

Section 3: Lifting

- I can lift heavy weights without extra pain
- I can lift heavy weights but it gives extra pain
- Pain prevents me lifting heavy weights off the floor, but I can manage if they are
- conveniently placed, for example on a table
- Pain prevents me from lifting heavy weights but I can manage light to medium
- weights if they are conveniently positioned
- I can only lift very light weights
- I cannot lift or carry anything

Section 4: Reading

- I can read as much as I want to with no pain in my neck
- I can read as much as I want to with slight pain in my neck
- I can read as much as I want with moderate pain in my neck
- I can't read as much as I want because of moderate pain in my neck
- I can hardly read at all because of severe pain in my neck
- I cannot read at all

Section 5: Headaches

- I have no headaches at all
- I have slight headaches, which come infrequently
- I have moderate headaches, which come infrequently
- I have moderate headaches, which come frequently
- I have severe headaches, which come frequently
- I have headaches almost all the time

Section 6: Concentration

- I can concentrate fully when I want to with no difficulty
- I can concentrate fully when I want to with slight difficulty
- I have a fair degree of difficulty in concentrating when I want to
- I have a lot of difficulty in concentrating when I want to
- I have a great deal of difficulty in concentrating when I want to
- I cannot concentrate at all

Section 7: Work

- I can do as much work as I want to
- I can only do my usual work, but no more
- I can do most of my usual work, but no more
- I cannot do my usual work
- I can hardly do any work at all
- I can't do any work at all

Section 8: Driving

- I can drive my car without any neck pain
- I can drive my car as long as I want with slight pain in my neck
- I can drive my car as long as I want with moderate pain in my neck
- I can't drive my car as long as I want because of moderate pain in my neck
- I can hardly drive at all because of severe pain in my neck
- I can't drive my car at all

Section 9: Sleeping

- I have no trouble sleeping
- My sleep is slightly disturbed (less than 1 hr sleepless)
- My sleep is mildly disturbed (1-2 hrs sleepless)
- My sleep is moderately disturbed (2-3 hrs sleepless)
- My sleep is greatly disturbed (3-5 hrs sleepless)
- My sleep is completely disturbed (5-7 hrs sleepless)

Section 10: Recreation

- I am able to engage in all my recreation activities with no neck pain at all
- I am able to engage in all my recreation activities, with some pain in my neck
- I am able to engage in most, but not all of my usual recreation activities because of
- pain in my neck
- I am able to engage in a few of my usual recreation activities because of pain in
- my neck
- I can hardly do any recreation activities because of pain in my neck
- I can't do any recreation activities at all

Score: /50 Transform to percentage score x 100 = %points

Scoring: For each section the total possible score is 5: if the first statement is marked the section score = 0, if the last statement is marked it = 5.

If all ten sections are completed the score is calculated as follows: Example:16 (total scored) 50 (total possible score) x 100 = 32%

If one section is missed or not applicable the score is calculated: 16 (total scored) 45 (total possible score) x 100 = 35.5%

Minimum Detectable Change (90% confidence): 5 points or 10 %points

NDI developed by: Vernon, H. & Mior, S. (1991). The Neck Disability Index: A study of reliability and validity. Journal of Manipulative and Physiological Therapeutics. 14, 409-415