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Original Research Article

EXPERIMENTAL STUDY TO COMPARE THE EFFECT OF SUBOCCIPITAL CRANIAL BASE RELEASE AND SUBOCCIPITAL FASCIAL SCRAPING ON THE EXTENSIBILITY OF OTHER SEGMENTS OF POSTERIOR KINETIC CHAIN

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ABSTRACT

Background: A Myofascial Kinetic Chain is a group of muscles that are connected through the fascia and are longitudinally positioned in the human body. If one of the structures within a meridian develops tension it will be distributed along entire myofascial continuum. Myofascial release techniques can be used to release the restricted or pathological fascial structures. Myofascial release is a hands-on soft tissue technique that facilitates stretch into the restricted fascia. Fascial scraping is done by superficial maneuvering of fascia by repeated fascial stroking in an effort to break the fascial adhesions.

Methodology: The study was performed on 30 girls with age 18-26 who has dysfunctions in posterior kinetic chain, of which 15 were in each of the two categories. Group A- treated with cranial base release and group B- treated with fascial scraping. Suboccipital length, Lumbar ROM, Pelvic tilt and Hamstring length was measured in 15 subjects of both the groups before the treatment and after 1 week of treatment.

Results: The analysis between the groups was done by using paired t-test and independent sample test. The analysis revealed significant result within the group and insignificant between the 2 groups.

Conclusion: Result of the study concluded that there is significant effect of both the techniques of Myofascial Release (Cranial Base Release and Fascial Scraping) of one segment in the extensibility of other segments of posterior kinetic chain.

KEY WORDS: Myokinetic Chain, Superficial Back Line, Cranial Base Release, Fascial Scraping.

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INTRODUCTION

The human posture is determined by muscular chains fascia, ligaments and bony structures, which are interconnected. Any dysfunction in any of these structures can lead to a postural disequilibrium and some initial tension can cause a sequence of combined tension [1]. Kinetic chain is often thought of as each joint in the

body being like each link in a chain. It is this chain of system linked together to create human movement. Thus, muscle and fascia are functionally linked [2]. Myers and Stecco describe models explaining myofascial trains crossing the entire body and linking head to toes and centre to periphery [3]. These are lines of pull based on standard western anatomy lines, which transmit strain and movement through body's myofascia around skeleton [4]. As stated by Myers, muscles never attach to bone. Their movement pulls on fascia, the fascia attached to periosteum and periosteum pulls on bone. Therefore if one of the structures within a meridian develops tension it will be distributed along entire myofascial continuum.

The superficial back line is a continuity of fascial fabric and it connects and protects the posterior surface of the body lika a carpace from the bottom of the toes around the heel and up the back of the body crossing over the head to its terminus at the frontal ridge at eyebrows [4].

The continuity of the neural system theoretically links the dura mater, which anatomically is inserted into the suboccipital muscles (particularly the rectus capitis posterior minor muscle) and the hamstring musculature.It has been reported that the limited flexibility of hamstring muscles provokes reduced pelvis mobility, disturbing the distribution of pressures in the spine, altering the lumbar curve, causing compensatory movement patterns of the lumbar spine, and subsequently increasing stress on the spinal soft tissues [5]. Connection of sub-occipital muscles with duramater and presence of myofacial chains that links the connective tissue fascia and muscles along specific lines in the body. It is important to study the treatment and influence on local region where treatment is taking place and also globally in distant region [6].

Myofascial release is a hands-on soft tissue technique that facilitates stretch into the restricted fascia [7]. Fascial Scraping is a fascial release technique done through scrapper tool, to through stimulation in specific areas produce local therapeutics effects and to restore the organic functions and break the fascial adhesions. Hence the myofacial release technique can be used to release the restricted or pathological fascial structures [8]. If a specific structural element of a myofascial chain is affected, the other structures in that chain also gets affected and need to be treated to return to full activity. Thus the anatomy trains map out the sets of sausage links within the body. The idea is that especially in postural habits and long-term sequelae from injury strain communicates along these longitudinal lines from one muscle to another [9].

MATERIALS AND METHODS

30 subjects were selected on the basis of inclusion and exclusion criteria. Subjects with dysfunction in posterior kinetic chain as evident of tightness and decreased exertion on forward bending toe touch test were targeted from accessible population. Prior to the study procedure was explained to the subjects and an informed consent was signed from each subjects. The subjects were randomly divided into two groups. The reading and measurement were taken on the first day before the intervention and after one week of intervention. Suboccipital Muscle Length was measured using inch tape, lumbar ROM was measured using Schober's method, pelvic tilt was measured by inclinometer and hamstring length was measured by straight leg raise test.Group A (n=15) received myofascial release through cranial base release and group B (n=15) received myofascial release through fascial scraping. Cranial base release was given with stretch maintained for 90-120 seconds and it was given for 3-5 minutes. Fascial scraping was given by scraping the fascia along the suboccipital muscles with the fascial scraping tool for 30-40 seconds before any skin colour changes are seen with the nodding movement.

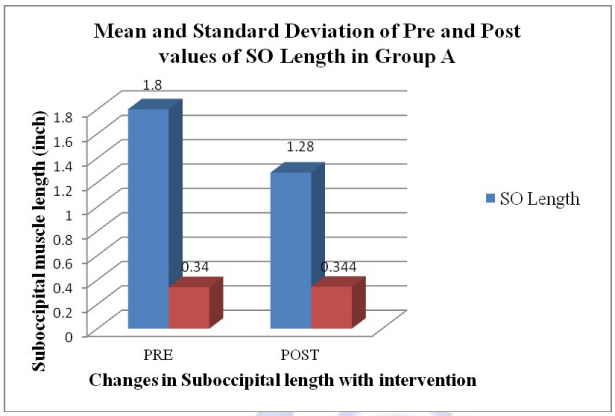
RESULTS

The analysis revealed that both the techniques of myofascial release (Cranial Base Release and Fascial Scraping) are equally effective.

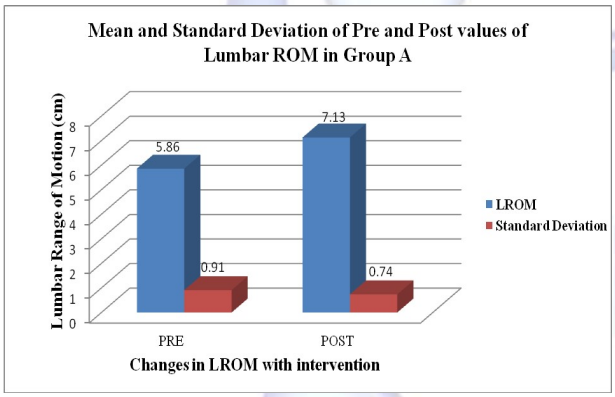
Table 1: Mean and Standard Deviation of Pre and Post values within Group A (CBR).

	Suboccipital Length Mean± SD	Lumbar ROM Mean± SD	Standing Pelvic Tilt Angle Mean± SD	Hamstring Length Mean± SD
Pre	1.8±0.34	5.86±0.91	4.13±1.30	35.66±11.15
Post	1.28±0.344	7.13±0.74	3.33±1.23	64.66±10.60
Significance	S (P=0.000)	S(P=0.000)	S(P=0.000)	S (P=0.000)

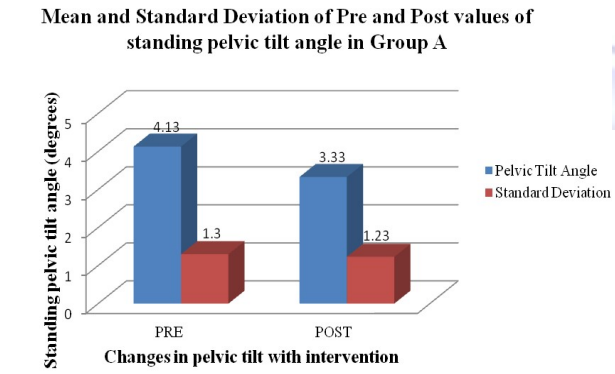
Graph 1: Mean and Standard Deviation of Pre and Post values of Suboccipital length within Group A (CBR).



Graph 2: Mean and Standard Deviation of Pre and Post values of Lumbar ROM within Group A (CBR).



Graph 3: Mean and Standard Deviation of Pre and Post values of Standing pelvic tilt angle within Group A (CBR).



Graph 4: Mean and Standard Deviation of Pre and Post values of Straight leg raise within Group A (CBR).

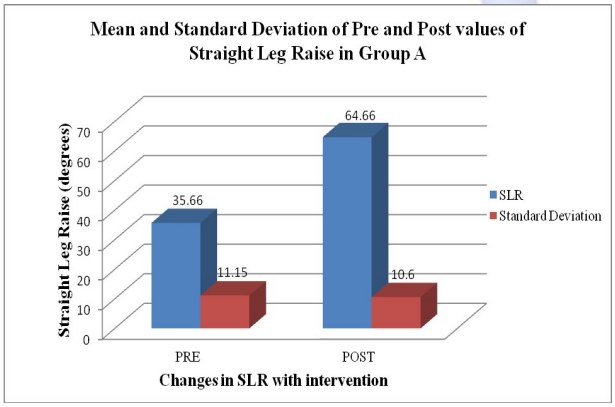
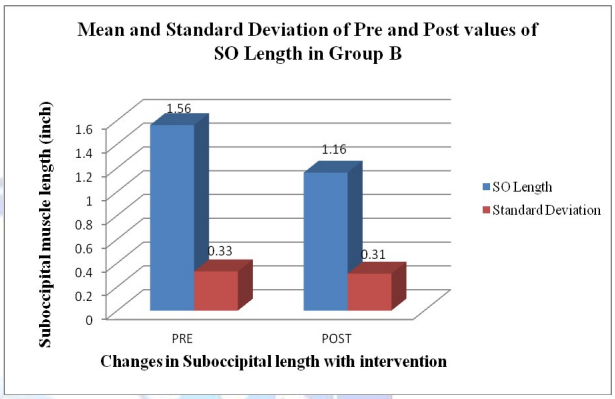


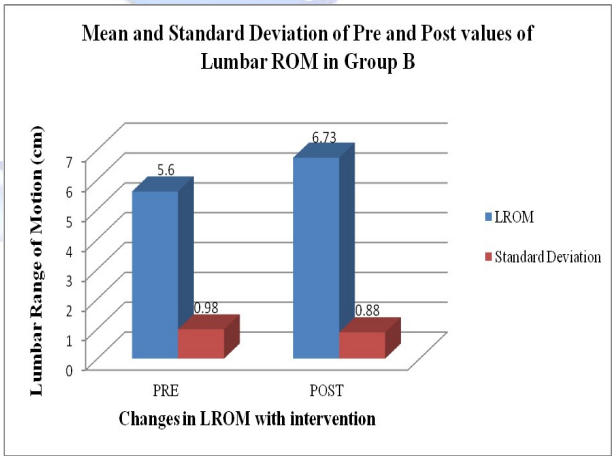
Table 2: Mean and Standard Deviation of Pre and Post values within Group B (Fascial Scraping).

	Suboccipital Length Mean± SD	Lumbar ROM Mean± SD	Standing Pelvic Tilt Angle Mean± SD	Hamstring Length Mean± SD
Pre	1.56±0.33	5.60±0.98	3.53±1.18	47.33±8.20
Post	1.16±0.31	6.73±0.88	2.73±1.22	70.33±8.33
Significance	S (P=0.000)	S (P=0.000)	S (P=0.000)	S (P=0.000)

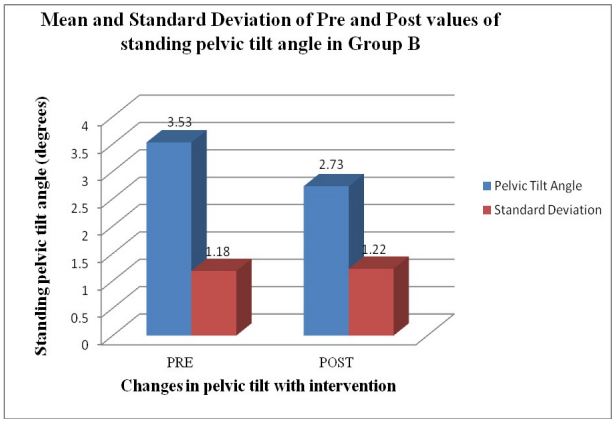
Graph 5: Mean and Standard Deviation of Pre and Post values of Suboccipital length within Group B (Fascial Scraping).



Graph 6: Mean and Standard Deviation of Pre and Post values of Lumbar ROM within Group B (Fascial Scraping).



Graph 7: Mean and Standard Deviation of Pre and Post values of standing pelvic tilt angle within Group B (Fascial Scraping).



DISCUSSION

In this experimental study, 30 individuals with tightness or dysfunction in posterior kinetic chain were selected. 15 individuals recieved myofacsial release technique by cranial base release and 15 individuals received myofascial release technique by fascial scraping of the suboccipital muscles. The study reveals that the Myofascial Release (Cranial Base Release and Fascial Scraping) given to one segment helped in the extensibility of other segments of Kinetic Chain.

At present, limited research has been undertaken to determine the effectiveness of fascial scraping. Fascial sraping tool helps in breaking up the scar tissue between muscle layers. This increases rate and amount of blood flow in and around area. This initiate and promote healing process of affected soft tissues.

Various authors have done numerous studies on the fascial links- Herting and Kessler described myofascial connection by explaining that the connective tissue is a continuous substance throughout body [10]. Benjamin (2009) in his study stated that the innervations of deep fascia should be considered in relation to its association with muscle [11]. Gary Fryer in his study stated that the cervical isometric contract relax treatment produced significant effect to the extensibility of hamstrings [12]. Pollard and Ward compared two techniques, a suboccipital muscle contraction-relaxation technique and a contraction-relaxation on hamstring muscles. They used the SLR test as an outcome measure, showing a significant improvement in the cervical zone intervention group by gaining increase in hip flexion range of motion.

Mohamed Eldesoky and Enas Abutaleb (2015) in their study stated that there is an anatomical relationship between the pelvis and lumbar spine , the lumbar spine posture depends on the pelvic alignment .Changes in the inclination of pelvis affected the degree of lumbar lordosis and lumbar range of motion. And thus foot posture alteration can produce effect in pelvis and spine [13]. The pelvis, an important segment, situated in the center of the body, connects the upper body to the lower limbs. Pelvic position has been found to highly correlate with the lumbar position [14]. Rockey and Marie (2008) in their study proved a significant relationship between pelvic inclination, hamstring extensibility and hamstring muscle strength.

McPartland noted the presence of Myodural Bridge connecting rectus capitis posterior minor muscles to the duramater. Myofascial chains links the connective tissue fascia and muscles along specific lines in the body [6]. The findings showed that treating the sub-occipital muscles for the dysfunction of other components of myokinetic chain was found to be effective. Jan Wilke (2016) in his study concluded that the muscles of the human body are regarded as part of a tensegrity-like, body-wide network, with fascial structures acting as linking components [15]. Any restrictions in the connective tissues will affect the ability of the musculoskeletal system to function efficiently. Muscles are thoroughly interwined and surrounded by fascia which explains why fascia have influence on muscle length and function when there occurs dysfunction in fascia [7].

Yucesoy, Koopman, Grootenboer, and Huijing in their study found that the transmission of force along the myofascia played an important role in muscle functioning, muscle length and the amount of force the muscles could generate [16]. When fascia in one area is stretched, it can cause tightness, restriction and pain in another part of the body [17]. A Muscle-Fascial Chain is a group of muscles that are connected through the fascia and are longitudinally positioned in the human body. They run in the same direction and overlap in a continuous chain, which efficiently conducts tension. All of the muscles in the chain are mutually dependent and behave as if they were a single muscle [18]. Thomas Myers referred to the muscular chains as anatomy trains because of their continuity. In myofascial meridian one muscle is attached to the next muscle.This fascial trains starts at plantar fascia of the feet, which c ontinues along the posterior side of the body and finishes on the brow line. The bony stations are plantar surface of toe, phalanges, calcaneus, condyles of femur, ischial tuberosity, sacrum, occipital ridge and frontal bone.

The Superficial Back Line (SBL) connects and

protects the entire posterior surface of the body from the bottom of the foot to the top of the head in two pieces - toes to knees, and knees to brow. When the knees are extended, as in standing, the SBL functions as one continuous line of integrated myofascia [4]. If fascia becomes tight or restricted at one point in the superficial back line then as a result of the continuity of fascia through the body, this initial disruption in the fascia will influence all structures the fascia is attached to and continuous with. In our study suboccipital muscle length, lumbar range of motion , pelvic tilt and hamstring length was measured to check how tension in one part of chain can affect other components of the meridian. Myers found that localized injury to any component would transmit tension along this line [4].

In our present study extensibility in the suboccipitals length, lumbar range of motion, pelvic tilt and hamstring was seen as an outcome measure and suboccipital muscles was given myofascial release and effect was seen on suboccipital length, lumbar range of motion, pelvic tilt and hamstrings length. When myofascial release was given to the one segment i.e., tight suboccipital muscles there was an increase in extensibility of other components which can be explained on the basis of myofascial continuity as fascia is continuous so when restriction is removed there occurs release of tension in fascial system, also it can be due to principle of tensegrity. As the model of tensegrity states that increase of tonus of one element of a structure causes analogical increase of tension of other elements remaining in mutual structural contact [13]. The present study suggested new approach to the treatment of dysfunction of more than one components by suboccipital muscle inhibition technique and encouraged further investigation of remote effect of cervical treatment favoring the authors who concluded that manual therapy of neck may have a role to play in treatment of extra spinal lower limb musculoskeletal conditions.

Thus this study suggests that myofascial chains can provide a biomechanical explanation for the effectiveness of myofascial treatments in musculoskeletal dysfunctions. It can serve as a guide for interpreting pain distribution but also as a topographical map for choosing specific, key areas for effective treatment. A characteristic of this method is that it evaluates and treats points at a distance from the region where subjects experience their pain.

Conflicts of interest: **None**

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