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Research Article

Effect of Release of Splenius Capitis and Splenius Cervicis muscles on Visual Impairments Resulting from Myofascial Dysfunction

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Abstract

One of the Common cause of myopia and hypermetropia is gaze-shifting mechanism as saccades and pursuit movements. The term gaze denotes attentive looking at something in this narrow sense, a gaze shift is the realignment of the line of sight so as to bring the image of a new object of interest to the central retina where receptor density and visual resolution are the highest. the eyes are never completely at rest. They make fast random jittering movements even when we are fixated on one point. The reason for this random movement is related to the photoreceptors and the ganglion cells. It appears that a constant visual stimulus can make the photoreceptors or the ganglion cells become unresponsive; on the other hand a changing stimulus will not. Methodology- Pre reading of vision was taken with the help of snellen'schart. Individuals received myofascial release of splenius capitis and splenius cervicis for one week each treatment session contains 90 to 120 second hold and release for 5 minutes to release the multiple layers of fascial restrictions the treatment is given for 1 week every day. Post reading of vision was taken with the help of snellen'schart. All the data recorded and analysed. Results- the effect of release of splenius capitis and splenius cervicis on visual impairment resulting from myofascial dysfunction is statistically significant and therefore alternate hypothesis is accepted.

Keywords: Splenius Capitis; Splenius Cervicis; Visual Impairments; Myofascial Dysfunction

Introduction

According to a recent study by the national eye institute (NEI) shows the prevalence of myopia grew from 25% of worldwide population (ages 12 to 25) in 1999-2004 to a whopping 41.6 percent in 2004-2017 [1]. The cause, and treatment of myopia have been debated for decades, and the exact mechanism of the development of myopia still remains unclear. Both environmental and genetic factors have been associated with the onset and progression of myopia [2]. The trigger points in splenius capitis and splenius cervicis may lead to atlantooccipital dysfunction which can further affect both parasympathetic and sympathetic innervations to the ciliary muscle, and consequently for the control of accommodation, gaze shift and blurring of vision [3]. Present understanding of ciliary smooth muscle dual innervations it is well known that the parasympathetic system provides the dominant innervations to the ciliary muscle and that this is mediated by the action of acetylcholine on muscarinic receptors (Gupta., *et al.* 1994; pang., *et al*.1994). Parasympathetic input to the ciliary muscle mediates positive accommodation and meets the need for rapid focusing changes because of its fast onset of action (1-2 s). It is also known that the ciliary muscle receives sympathetic innervations, which is mediated by the action of noradrenaline on two subclasses of post-synaptic receptors, a1- and b2-adrenoceptors, both of which are inhibitory [4]. One of the common cause of myopia and hypermetropia is gaze-shifting mechanisms as saccades and pursuit movements. The term gaze denotes attentive looking at something in this narrow sense, a gaze shift is the realignment of the line of sight so as to bring the image of a new object of interest to the central retina where receptor density and visual resolution are the highest.[5] the eyes are never completely at rest. They make fast random jittering movements even when we are fixated on one point. The reason for this random movement is related to the photoreceptors and the

ganglion cells. It appears that a constant visual stimulus can make the photoreceptors or the ganglion cells become unresponsive; on the other hand a changing stimulus will not. Therefore, the random eye movement constantly changes the stimuli that fall on the photoreceptors and the ganglion cells, making the image more clear. Saccades are the rapid movement of eyes that is used while scanning a visual scene.[6] in our subjective impression, the eyes do not move smoothly across the printed page during reading. Instead, our eyes make short and rapid movements called saccades. During each saccade the eyes move as fast as they can and the speed cannot be consciously controlled in between the stops. The movements are worth a few minutes of arc, moving at regular intervals about three to four per second. One of the main uses for these saccadic eye movements is to be able to scan a greater area with the high-resolution fovea of the eye. Tightness of splenius capitis and splenius cervicis muscle can cause headache, neck pain, homolateral blurring of vision., moreover the autonomic connection and control of the eye comes from the upper cervical vertebra, which starts from upper cervical vertebras and goes to superior cervical ganglion connecting to the eyes [3].

Aim of the study -to determine improvement in the visual impairments by release of splenius capitis and splenius cervicis muscle resulting from myofascial dysfunction.

Objectives- to find visual impairments in patient with concurrent increase in tone of splenius capitis and splenius cervicis muscles and to evaluate the effect of release of splenius capitis and splenius cervicis on visual impairments resulting from myofascial dysfunction.

Materials and Methods

An quasi experimental study was conducted at research laboratory in department of physiotherapy sardar Bhagwan singh post graduate institute of biomedical sciences and research Balawala Dehradoon. Started in October 2016 and research was completed in October 2017. The approval of the study was given by the ethical and research committee of sbspgi. Seventy individuals who have established blurring of vision since past 1year. Targeted population were all students who have established blurring of vision. Sample size was of 35 individuals in between age group of 18 to 25.

- **Inclusion Criteria:** Both genders In the ages between 18 To 25 Years, increased Tone On Palpation Of Splenius Capitis And Cervicis Muscles, established Patient Of Blurring Of Vision.
- **Exclusion Criteria:** Any other vision deficit due to any systemic disorder or Neurogenic Disorder, Congenital Anomalies in the Cervico-Occipital Region, Patients who were Undergoing Any Other Treatment/Therapy for the Same, Individuals who cannot comply with the protocols given.
- **Dependent Variable:** Visible Acuity Measured by Snellen's Chart
- **Independent Variable:** Myofascial Release of Splenius Capitis and Splenius Cervicis

Procedure was explained in detailed to the participants followed which the return inform consent were taken. Pre reading of vision was taken with the help of snellen's chart. Individuals received myofascial release of splenius capitis and splenius cervicis for one week each treatment session contains 90 to 120 second hold and release for 5 minutes to release the multiple layers of fascial restrictions the treatment is given for 1 week every day. Post reading of vision was taken with the help of snellen's chart. All the data recorded and analyzed. The patient is made to sit on a chair and the snellen's chart is placed at the distance of 3 meters, the room had good natural light and the patient washed his/hers hands as they used their one hand to cover one eye at a time, each eye was tested separately the patient is asked to remove their currently using specs , and read the snellen's chart alphabets in a loud and clear voice using right eye and left eye is covered with other hand after that the patient covered his right eye and asked to read the chart again using his left eye in a loud and clear voice, the therapist standing next to the patient noted the last visible correct alphabet said by the patient.

After the last alphabet was noted. The treatment started for that patient, for the lest eye, the patient was in supine lying with their neck at the edge of the table, neck laterally rotated towards the left and flexed, the splenius capitis is palpated, to palpate splenius capitis we put one finger on the patient's sternocleidomastoid, rotate patient's neck to the opposite site and feel this muscle contracting. Then, move your finger slightly - 1 cm - towards your spine until you feel a tiny well - not deeper than 0.5 cm-splenius capitis is palpable now. (Travel and simons). The patient is asked to maintain the neck in lateral rotation to the opposite side and flexion position then the splenius capitis of ipsilateral side is released using myofascial release the muscle is hold for 90-120 to break the collagenous barrier with gentle but firm pressure and release as it responds by softening of the barrier the protocol was performed for 5 minutes on either sides, after that the patient is asked to extend the neck , rotate to the ipsilateral side and lateral flex to the ipsilateral side to relax other muscles like levator scapulae and to palpate splenius cervicis we put our finger beneath Trapezius and move towards c7 spinous process the muscle belly is palpable now. The patient is asked to maintain the neck in extension and rotated to the ipsilateral side and laterally flexed to ipsilateral side, then the splenius cervicis of ipsilateral side is released using myofascial release. the muscle is held for 90-120 to break the collagenous

barrier with gentle but firm pressure and release as it responds by softening of the barrier. The protocol was performed for 5 minutes on either side per day for 7 consecutive days.

Then after 7 days of consecutive treatment the patient is asked to sit on the chair again and the snellen's chart is placed 3 meters away from him. Again the patient is asked to close his one eye with one hand and read the alphabets on chart again in loud and clear voice and the therapist is standing next to him to note last alphabet visible and note the improvement from both the eyes respectively.

Results

The two-tailed p value equals 0.0026 by conventional criteria, this difference is considered to be very statistically significant. The p value was calculated with mcnemar's test with the continuity correction. Chi squared equals 9.091 with 1 degrees of freedom. The p value answers this question: if there is no association between risk factor and disease, what is the probability of observing such a large discrepancy (or larger) between the number of the two kinds of discordant pairs? A small p value is evidence that there is an association between risk factor and disease. The odds ratio and its confidence interval cannot be calculated because one of the discordant values is zero.

Control Case		Total	
+ve Effect	19	0	19
No Effect	11	0	11
Total	30	0	30

Table 1: Showing control case with effects.

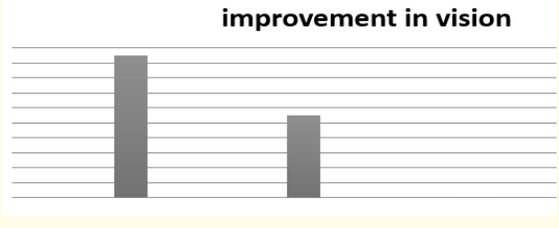

Figure 1: Graph Showing Improvement in Vision.

Discussion

The study was conducted to evaluate the effect of release of splenius capitis and splenius cervicis on visual impairment resulting from myofascial dysfunction, results of which showed that the procedure was able to produce significant improvement in visual impairments.

Ross., *et al*. conducted a study "cervical instability as a cause of barré-liéou syndrome and definitive treatment with prolotherapy: a case series" in which he stated that, barré-liéou syndrome is thought to be caused by a disruption of sympathetic nerve function by structural deformation of the cervical spine. Other symptoms can include laryngeal disturbances known as "oscillating aphonia" as well as neck muscle cramps and psychoneurotic manifestations, typically insomnia, anxiety, and depression. Symptoms that characterize barré-liéou syndrome also include facial pain or numbness, ear pain, tinnitus, hoarseness, severe fatigue, muscle weakness, sinus congestion, a sense of eyeball extrusion, dysesthesias of the hands and forearms (pins-and-needles sensation), corneal sensitivity, dental pain, lacrimation, blurred vision, shoulder pain, unilateral swelling of the face [2].

Toates (1972) in his much-cited review provided evidence for dual parasympathetic and sympathetic innervations to the ciliary muscle, and consequently for the control of accommodation. More recent comprehensive reviews by Gilmartin., *et al*. (1992) have also examined the role of the ciliary muscle innervations, particularly of the sympathetic input, in myopia development [7].

Berthoz., *et al.* Conducted a study, "eye-head coupling in humans" which investigated a tonic coupling between the horizontal component of eye position and dorsal neck muscle activity in humans. They recorded the activity of isolated motor units in the splenius muscle during large horizontal eye movements in head fixed subjects. The results suggest that eye-head coupling is present not only during the fixation period but also during saccades and that a phasic activity or suppression related to saccadic eye velocity is present in dorsal neck muscle emg [8].

In previous study of sousa., *et al.* Showed a significant effect of myofascial release on tension type headache induced to trigger points of the neck muscles including splenius capitis and cervicis.

Gilmartin., *et al.* (1992) said trigger points in splenius capitis and splenius cervicis may lead to atlas dysfunction which can further affect dual parasympathetic and sympathetic innervations to the ciliary muscle, and consequently for the control of accommodation , gaze shift and blurring of vision [9].

Morgan., *et al*. (2005) in his study stated that, myopia has been broadly classified by age of onset as pathological, school age, or adult onset. Pathologic myopia, which usually presents before six years of age, is caused by abnormal and extreme elongation of the axial length of the eye, generally does not progress, and is usually associated with early retinal changes.2,1 22 school age myopia occurs between 6 and 18 years of age and is thought to progress and stabilize by the late teens or early twenties, between the age group of 18 to 25 [10].

Christina., *et al.* In her study stated that there is strong co-variation between visual and musculoskeletal complaints in the armd confirms the hypothesis that a reduced visual function is associated with neck/scapular area muscular complaints. The linear stepwise regression analysis extended these findings further by indicating that visual complaints and minimum readable typefaces were both important predictive factors for musculoskeletal complaints. The stepwise linear regression analysis also identified selfrated visual quality to be the parameter with the highest impact on balance/proprioception [9].

The combination of these results strongly suggests that individuals with low visual acuity, who require a larger print size, are more likely to experience disabling discomforts and complaints from muscles in the neck/scapular area. Visual and balance/proprioceptive complaints were more pronounced relative to the musculoskeletal complaints, with the latter being, on average, rather modest and similar across groups [10].

Simons., *et al*. In their study proved that the pain of active trigger points in trapezius and splenius cervicis radiates into the head (trapezius pattern) and above the eye (splenius cervicis pattern). The pain had previously been diagnosed as occipital neuralgia. In addition to pain an upper splenius cervicis trigger points may cause blurring of vision in homolateral eye, without dizziness and conjunctivitis [11].

Authors suggested that the patient having blurring of vision had increased tone in neck muscles mainly splenius capitis and splenius cervicis, thus myofascial release lead to normalisation of tone of the muscles afore mentioned. Further, this showed a better vision when evaluated using snellen's chart.

In addition, the procedure given lead to ease in neck movements and improved forward neck posture as well.

Limitations of the Study

- Precise differential diagnosis of the visual disturbances was not possible so the population criteria were limited to a wider prospective of blurring of vision.
- Congenital anomalies or fat could have resulted in difficulty in palpation and the precise release might not have been possible.
- The subjects of the study were not checked for any kind of exercises or yoga which they are currently doing.

Clinical Significance

Adolescence is a period of heightened vulnerability when teenagers engage in activities like increase in use of laptops and phones. Moreover, there is a severe lack of physical activity in the growing population due to which the myofascial dysfunction occurs and the vision gets affected. So, to improve the vision, correction of these myofascial dysfunctions is necessary through early identification and diagnosis of vision related issues in early stages. So, this study will help to prevent these types of abnormalities before arriving and also treat the patients with the already developed abnormalities.

Conclusion

Authors concluded that the effect of release of splenius capitis and splenius cervicis on visual impairment resulting from myofascial dysfunction is statistically significant and therefore alternate hypothesis is accepted.

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