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Combine Effect of Myofascial Release and Ocular Muscle Exercise for Eye Strain Headache in University Students: Randomized Controlled Trial

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All authors equally contributed to the study and approved the final manuscript.

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ABSTRACT

Background: Eyestrain headache commonly found in myopia patients, caused by exaggerated workload or strained due to the prolong activities which required highly focusing, such as reading and using digital gadgets. Symptom includes peri-orbital pain, forehead heaviness, fuzzy or cloudy vision, and dry eyes. **Objective:** To determine the combine effect of myofascial release in eyestrain headache participants using ocular muscle exercises and to find the length of sternocleidomastoid and upper trapizus muscle in myopic individual after the treatment. **Methods:** An experimental study was conducted at Abasyn University, Peshawar, followed by the inclusion criteria. A total of 36 participants between 20 to 30 years of age were included. We equally divided the participants into two groups A (experimental) and group B (control). Out of 36 participants 8 (44.4%) were male and 14 (77.8%) were female in the experimental group while 10 (55.6%) male and 8(22.2%) were female in the control groups, having mild to moderate myopia, unilateral or bilateral headaches, and peri-orbital pain. The study was carried out for three weeks periods, with three sessions each week of the treatment. Computer vision syndrome questionnaire was filled before and after completing their session. For data analyses SPSS version 25 was used. **Results:** The mean age in the experimental group were 1.38 years while control group were 1.44 years respectively. Their mean visual acuity in group A 9(50.0%) and group B 15(83.3%) was mild while in group A 9(50.0%) and groups B 3(16.7%) were moderately affected. A significant reduction was noticed in eyestrain headache individuals by using myofascial release techniques on the neck muscles (sternocleidomastoid and upper trapezius) and muscles lengthening were significantly increased after an exercise which enhances muscle flexibility and elasticity. A mixed ANOVA test was performed between the groups. **Conclusion:** The study's findings indicate that myofascial release therapy and ocular muscle training significantly reduced headaches caused by eyestrain and increased the length of the neck's sternocleidomastoid and upper trapezius muscles.

INTRODUCTION

Visual perception is the ability of an individual to see and interpret environmental information into useful information by using eyes. It is a process that begins with the optic nerve sending electrical signals to the brain carrying the visual data gathered by the cornea, iris, lens, and retina of the eye (1). A healthy vision influences many parts of daily life such as safety, independence, social interaction, education and healthy life style (2). A number of things contributed in impair vision, including refractive problems like myopia (nearsightedness), farsightedness and as well as eye conditions including cataracts, glaucoma, and macular degeneration (3). Myopia is a condition wherein nearby objects are clear but farther away objects are fuzzy or blurry. It occurs when specific eye parts' shapes cause light rays to bend wrongly (4) (5). Nearsightedness typically develops between childhood and adolescence myopia is often stabilized between the ages of 20 and 40 (6). A type of headache called eye strain headache is frequently brought on by prolonged eyestrain from activities like reading, using digital screens (computers, smartphones, tablets), or working closely for extended periods of time without taking enough breaks (6). According to a Khyber Medical University survey on

eye strain headaches, 70% of medical students in Peshawar, Pakistan, have digital eye syndrome, underscoring the negative effects of prolonged screen use on eye health. (7)(8). The age group of 19–29 had the highest frequency of headaches; this could be related to patients in that age range having more academic or near-task commitments, which would raise near-task demands (9). An eyestrain is characterized by sore, burning, itching eyes, tenderness in neck or shoulder muscles, dry eyes, increase sensitivity to light and headache (10). Eye strain headache is mainly caused by extra ocular mechanism e.g musculoskeletal symptoms such as (headache, backache, shoulder discomfort, and stiffness in the neck. These symptoms are linked to poor posture caused by misaligned computer screens, an uncomfortable height for a table or chair, or an insufficient gap between the eye and the screen, which causes needless forward bending or stretching that frequently sprains the muscles (10). Accordingto this study, Korean wage labourers were more likely to have headaches and eyestrain during the COVID-19 pandemic as their visual display terminal working hours prolonged. Worker headache/eye strain was reported by 14.4% of the non- visual display terminal group, while it was reported by 27.5% of the visual display terminal group. Comparing the VDT work group to the non-VDT work group, the adjusted OR for headache/eyestrain was 1.94 (95% CI: 1.80–2.09), and the adjusted OR for the group that always used VDT was 2.54 (95% CI: 2.26–2.86), compared to the group that never used VDT(11).

Previous studies showed that ocular muscle exercises (palming, blinking, pencil pushups) improved ocular strength and digital eye syndrome symptoms. Through a combination of myofascial release treatments and eye exercises, this study will address the musculoskeletal and visual elements of headaches and eyestrain. This study will improve students' quality of life, lessen the effects of eyestrain headaches, and increase their academic performance both in person and online.

MATERIAL AND METHOD

A randomized controlled trial was carried out at Abasyn University for a duration of three months (1st January 2024 to 15 March 2024.The Institutional Review Board and Ethics Committee gave their approval before the trial was started. Written informed consent were taken from the participants before the study. The sample size was determined by using the G Power application. After screening procedure, 36 participants between the age of 20 and 30 were selected who had eye strain headache had symptoms that lasted for more than a month up to six months, and who also had experienced pain around eye, forehead, neck and shoulder pain, eye redness. Visual activities like reading, using a computer, or using a cell phone headaches worse. Upper trapezius and sternocleidomastoid triggers are linked to headaches.

Individuals who had the following conditions such as genetic eye disease, refractive surgery, wear contact lens, History of neck trauma, cervical radiculopathy, herniated disc, and arthritis were excluded from this study. Subjects fulfilling inclusion criteria were randomly allocated into 2 groups, i.e. Students in Group A (experimental group) and Group B (control group) performed three exercises that target the ocular muscles: the pencil pushup, the blinking exercise, and the palm exercise. Every exercise was done five days a week in three sets of ten repetitions. In addition to strengthening exercises, there are neck isometric exercises. This exercise was done five days a week in three sets of five repetitions. Group A participants additionally underwent myofascial release treatment for their upper trapezius and scm muscles. Three times a week, individuals received treatments ranging from three to two minutes. Outcome is measured at baseline, after 1 week, then 2nd week, and third week. Subjects in group B received ocular muscle exercise and neck isometric exercise the same protocol as mentioned above.

The data was collected and examined independently to protect the participants' privacy. Complete information about the study and intervention was provided to each patient, and prior to the start of the treatment program, informed written consent was obtained in Urdu or English, depending on the situation. SPSS version 25 was used to analyze the data. Demographic and descriptive data were presented using percentages, frequencies, means plus standard deviation. The Shapiro-Wilk test was used to determine whether the data were normal distributed. The repeated measure ANOVA was utilized for the within-group analysis and the mixed way ANOVA was used for the between-group analysis due to the normality of the data ($P>0.05$).

RESULTS

A total of 36 participants were included in the research study in which 14 (77.8%) were female and 8 (77.8%) were male in group A while in group B 4 (22.2%) were female and 10 (55.6) were male. The education status of the participants in A group the number of participants in DPT were 13, in radiology was 1 student and in cardiology were 4 and in another group B the 12 participants in DPT, 3 in radiology and 3 in cardiology. The vision acuity in group A 9 (%) were mild and 9 (%) participants had moderate. In group B 15 (%) were mild and 3 (%) were moderate**.** Participants with impaired vision were similarly dispersed throughout the two groups, with two unilateral and sixteen bilateral. The normality of the data was determined at baseline values of the variables with Shapiro-Wilk test. Based on the normality of the data the parametric test such as Mixed way ANOVA was applied for between group comparison and repeated measure ANOVA for within group comparison.

According to the results of the within-group analysis, computer vision syndrome showed that participants in group A who received myofascial release treatment with ocular and neck isometric exercise had decrease in eyestrain headache with P value ≤0.005 than the participants of group B who received only ocular and neck isometric exercise. However, between-groups analysis also revealed showed that combine effect of myofascial release technique with ocular muscle exercises and neck isometric exercise were effective in reducing eyestrain headache with P value ≤0.005 than the other group who received only ocular and neck isometric exercise. Within and between the group analysis the group A showed that length of sternocleidomastoid and upper trapizus muscles is increase with the treatment of myofascial release technique.

Fugure 1 to 4

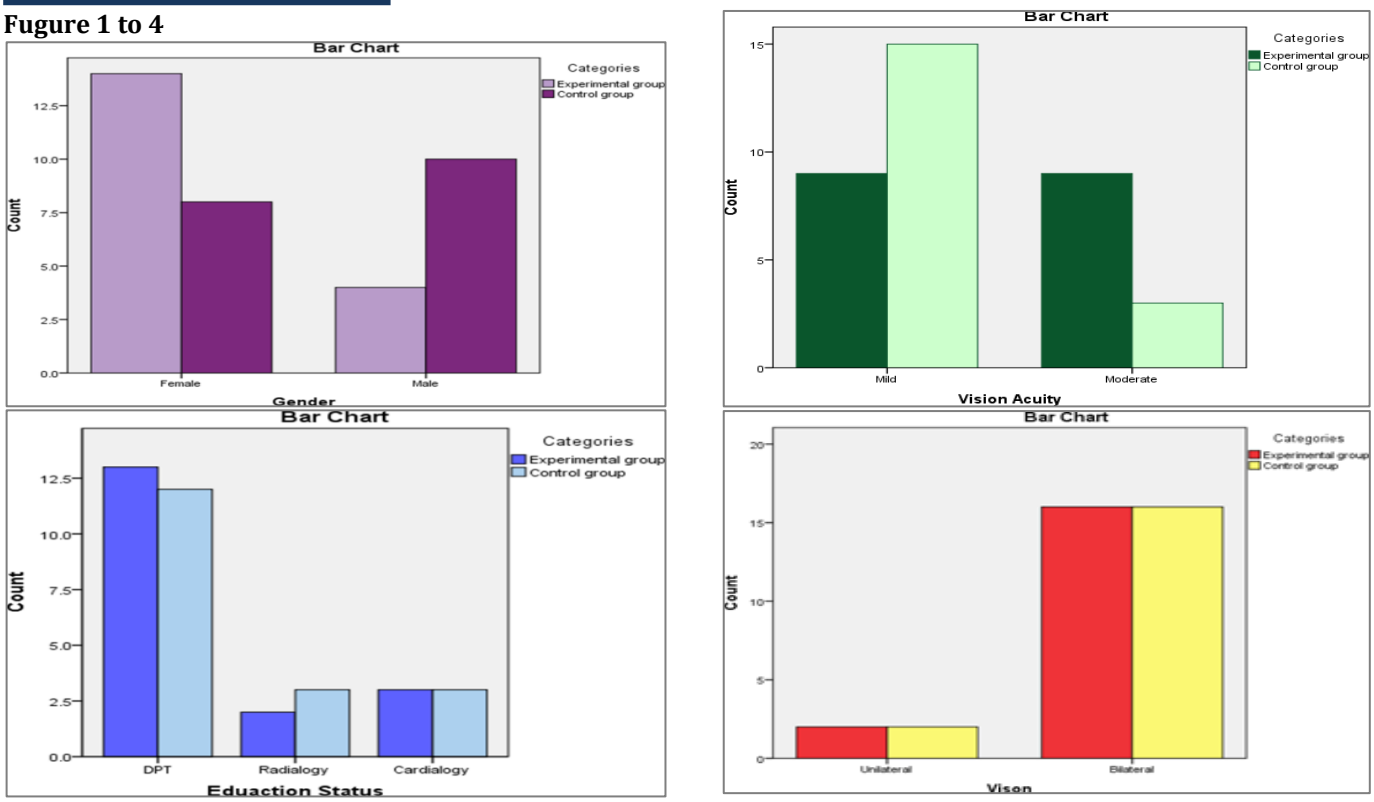

Table 1

One way and Repeated Measure Anova between and within group

Variables		Mean ±SD Experimentalgroup	Mean ±SD Control group	F-Value	P value
CVS	Baseline	27.83 ±3.348	29.56 ±2.915	2.710	.109
	1st week	25.39±3.202	27.50±2.875	4.333	≤0.001***
	2nd week	24.17 ±3.468	26.89 ±3.008	6.329	≤0.001***
	3rd week	22.50 ±3.185	22.50 ±3.185	11.601	≤0.001***
	Within group p –value	≤0.001***	≤0.001***		
SCM musclelength	Baseline	5.44 ±1.790	4.50 ±1.098	3.642	.065
	1st week	7.87 ±.671	7.50 ± .514	5.120	≤0.001***
	2nd week	8.33 ±.707	7.50 ±.514	14.678	≤0.001***
	3rd week	8.58 ±.600	7.44 ±.616	31.577	≤0.001***
	Within group p –value	≤0.001***	≤0.001***		
Upper trapizus muscle length	Baseline	5.06±1.056	5.89 ±1.568	3.500	.070
	1st week	9.92 ±.414	9.53 ±.528	6.226	≤0.001***
	2nd week	10.18 ±.366	9.53 ±.528	18.450	≤0.001***
	3rd week	16.19 ±25.409	9.53 ±.528	23.263	≤0.001***
	Within group p –value	≤0.001***	≤0.001***		

Table 2

Full form of abbreviations

Serial	Abbreviation	Description
1.	CVS	Computer vision syndrome
2.	DES	Digital eye strain
3.	DD	Digital device
4.	MFT	Myofascial release technique
5.	SCM	Sternocleidomastoid
6.	TMM	Tape measure method
7.	VDT	Visual display terminal

DISCUSSION

The purpose of this study was to determine how myofascial release therapy and ocular muscle training affected myopic students' headaches from eyestrain. In order to gather pre-treatment data, a questionnaire, the tape measure method, the myofascial release technique, and exercises to strengthen the neck and eyes were used. Post-treatment data for the same variable was also gathered, and conclusions were drawn. This study was carried out at Abasyn University in Peshawar, Pakistan, in several health-related subjects. The results showed that myofascial release therapy and ocular exercise had an impact on students who had headaches from eye strain.

Roderiguez et al. conducted a study in 2020 in which they found there was a significant effect in lowering and releasing trigger points on the neck than using massage, ultrasound, and TENS. Here were between group differences in change score at the 1 month follow up with the NPRS (mean = -1.56, 95% CI [-2.30 to -0.81]; P <.001(12). Within the group analysis, the computer vision syndrome showed that participants in group A, who received myofascial release treatment with ocular and neck isometric exercise, had a decrease in eye strain headache with a P value ≤0.005 compared to the participants in group B, who received only ocular and neck isometric exercise. This can be justified through another study that is conducted by Lu Z et al. in 2020 in which they showed that MFR treatment can greatly reduce pain and disability in tension type headache, cervicogenic headache,

and migraine (13).

The eye strain headache is also associated with posture and body positioning. Improper sitting posture, such as forward head, causes neck muscle tightness because of the continuous maintenance of the same position for a long time. Ganus PV et al. showed that myofascial release technique of the neck and upper limb is a faster-acting treatment that works well for patients with mechanical neck pain. (14) The eye muscle exercise also showed a great effect in reducing eye strain symptoms and provided strength to the eyes and also showed improvement in eye function, such as concentrating on both close and distant items (15). Within the group analysis, the group A showed that the length of the sternocleidomastoid and upper trapezius muscles is increased with the treatment of the myofascial release technique. A study was conducted by Manheim et al. in 2017. In their study, they found that myofascial release treatment increases muscle length and overall flexibility by changing the viscoelastic characteristics of fascia, making it less stiff and more elastic (16).

Between the group analysis of A and B, the length of the muscle of the sternocleidomastoid and upper trapezius is increased from pre-test to post-test with the p-value <0.05. Sarah et al. showed that treatment and time exhibited a significant interaction for FSP (p =.018, ηp =.093), with FSP falling from PRE MFR (128 ± 19 mm) to POST MFR (123 ± 19 mm; p < .001, ηp =.420) (17). According to Alshami the muscle length can be measured with cloth tape. In this study they measured the length and girth of calf muscle (18).

CONCLUSION

This study concluded that both interventions are effective in reducing eye strain headache, but the combined effect of myofascial release technique and ocular muscle exercise is more beneficial than the other only ocular muscle exercise in reducing headache. The result of this research article comes to conclude that myofascial treatment also increases the length of the sternocleidomastoid and upper trapezius muscles in the neck.

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