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Original Article

Comparison of Aerobic Exercises Vs Orbital Massage in Patients with Dry Eyes

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ABSTRACT

Objective*: To evaluate the efficacy of orbital massage compared to aerobics in patients with dry eye disease.*

Methods*: Power analysis on this study was done using G*Power sample size to give a total of 40 participants grouped into 2 separate groups of participants. Group A – aerobic exercises and Group B – orbital massaging. Patients with other ocular diseases or who had undergone recent eye surgeries, and systemic conditions that could interfere with tear production and the ability to perform the prescribed interventions were excluded. It was obtained at the baseline and after 1 week, and at the end of the 1st and 2nd months using the Ocular Surface Disease Index (OSDI) and the Schirmer Test.*

Results*: Both the interventions proved to be effective in improving Schirmer results and OSDI score and was maximal in aerobic exercise. However, based on the method used, the Schirmer test, it was established that overall tear production decreases with time in both group. The only statistically significant relationship was observed in the Orbital Massage group at Month 2 in case of Schirmer Test and OSDI scores. Two-sample Mann-Whitney U tests showed no significant difference between the groups for tear production and dry eye symptoms at the 2nd month, meaning both treatments are effective.*

Conclusion: *This paper finds out that aerobic exercise and orbital massage equally improve dry eye condition after two months.*

Keywords*: Dry Eye Disease, Orbital Massage, Aerobic Exercise, Schirmer Test, Ocular Surface Disease Index.*

1. INTRODUCTION

The disease known as dry eye is common and complex and affects the precorneal tear film. Dry eye is a condition in which the eyes do not secrete enough tears, or in which the quality of the secreted tears is not sufficient to lubricate the eyes correctly. This condition results in the spectrum of epithelial diseases of the ocular surface, neurosensory disturbances, and inflammation.(1)

Dry eye disease (DED) can be categorized into two main types: these include the aqueous-deficient dry eye, where lacrimal secretion is low and evaporative dry eye in which there is increased tear film evaporation or a mix of the two. In some of the early stages, patients with DED may display increased production of tears in an attempt to compensate for the problem from the lacrimal glands. Nonetheless, this reflexive tearing normally reduces as the condition progresses.(2)Based on this estimation, a roughly estimate would be that 10-15% of patients with DED experience the pure aqueous-deficient type of dry eye, while the rest, that is 85%, have the evaporative kind.(3)While there is evidence that a lack of ocular mucins can add to DED, their incidence is still unknown.(4-6) MGD is more common in Asian countries than in the US, Australia and Europe. Indeed, MGD is found in 70-90% of patients with DED.(7, 8)Quality of life depends on vision, and even minor violations are often accompanied by DED.(9)

The role of exercise in the treatment and prevention of eye diseases is slowly becoming apparent due to growing research interest.(10) This paper aims to present a review of the current literature to determine how physical activities may help ocular diseases. It also seeks to investigate the mechanism behind this, and in order to promote further research on the detailed process through which exercise assists eye health, the ideal targets of which hopefully form the foundation for new ocular diseases treatments.(11)

Manually performed eyelid massage using a finger, a glass rod, or in combination with topical application of certain medications is an effective treatment for various conditions such as chronic marginal blepharitis, meibomianitis chronic palpebral conjunctivitis trachoma and in the management of glaucoma.(12)Eyelid ocular massage for dry eye disease is most frequent method used. In treating MGD, massage is usually employed following warm compress on the lids to unblock glands that release lipids.(13)

This three-armed, parallel, randomized clinical trial seeks to compare the effectiveness of aerobic exercises to orbital massage in the treatment of dry eyes. With the increasing appreciation of PA in relation to overall health, the purpose of this work is to establish if benefits include ocular health with an emphasis put in Dry Eye Disease (DED). They found out aerobic exercises which are exercises good for overall health, cardiovascular diseases, and even helps lessen inflammation that may affect the eyes, may also affect ocular health through improved blood circulation and reduced inflammatory biomarkers tied to DED. On the other hand, orbital massage may have more objective selective therapeutic effects in the periocular area due to promoting meibomian gland function, enhancing tear film stability and reducing the severity of DED.

2. METHODOLOGY

This study was done in Teaching Hospital Dera Murad Jamali over a period of October 2023 to June 2024 with the total sample size of 40 participants based on sample size estimation, using G*Power. One group of twenty patients with dry eye disease aged between eighteen-five and sixty-five years

was chosen for aerobic exercise or orbital massage.

Specifically excluded were other ocular diseases, recent eye surgery and conditions that impact on tear production. The exercise group exercised by brisk walking, jogging, or cycling for 30 min, 5 times in a week), while the massage group did 5-min eyelid massage twice a day. To minimize between-group variability introduced by extraneous variables related to physical exercise, the participants' aerobic activity levels were prescribed and reviewed, and activity record was kept for each subject. OSDI and Schirmer Test I were tender as the assessment of effectiveness and follow up was done at 1 week, 1 month and 2 month. Data analysis was conducted in max stat. The study received ethical approval from the institutional review board of Superior University, Lahore (IRB/FAHS/DPTRS/2/24/MS/RS-3419).

3. RESULTS

The participants of the study were people between the ages of 18 and 50 years. In more detail, 11 participants were aged between 18 and 30, accounting for 27.5% of the sample, 13 participants were aged between 31 and 40 and 16 participants were aged between 41 and 50 contributing to 32.5% and 40% respectively. The mean age of the sample is about 48.33±4.41 years. There are 19 males (47.5 %) and 21 female (52.5 %) among the 40 participants thus showing that the study has slightly more female participants. To determine the differences within each group for Schirmer test and OSDI scores for time, Friedman's Two way analysis was applied to assess the impact of aerobic exercises, orbital massage on dy Habitual eye rubbing was NOT associated with lower Schirmer test results, while staring at a computer for more than 2.

Table 1: OSDI and Schirmer Test Results for Aerobic Exercises and Orbital Massage

Groups		Mean ± SD	P-Value	Mean ± SD	P-Value
		Schirmer Test		OSDI	
Aerobic Exercises	Baseline	3.50 ± .513	0.00	3.65 ± .489	0.00
	Week 1	3.10 ± .718		3.20 ±.696	
	Month 1	2.75 ± .851		2.45 ± .826	
	Month 2	1.85 ± .671		1.90 ± .788	
Orbital Massage	Baseline	3.55 ± .605	0.00	3.45 ± .605	0.00
	Week 1	2.55 ± .826		2.45 ± .826	
	Month 1	2.25 ± .786		1.85 ± .875	
	Month 2	1.50 ± .688		1.65 ± .745	

Table 1 revealed that both the aerobic exercises and orbital massage have a positive impact on the symptoms of patients with dry eye as well as the tear secretion over a period of 2 months. For the Schirmer Test, this test that measures tear production, the aerobic exercises group reduced the mean from 3.50 at baseline, and 1.85 at month two, and the p-value was 0.00. Likewise, the orbital massage group had a reduction from a baseline mean of 3.55 to 1.50 in month 2, closely followed by a significant p-value of 0.00. Coming to the Ocular Surface Disease Index (OSDI), which provides a measure of the dry eye symptoms experienced by the patients, aerobic exercises group again recorded a reduction from baseline mean of 3.65 to 1.90 at month 2 level and the p value is highly significant with a value of 0.00. The orbital massage group reduced from the initial mean of 3.45 to 1.65 at month 2 with a significant p- value of 0.00. These findings suggest that both interventions resulted to effective improvement of dry

eye emotion and tear rate with marginal greater improvement in the aerobic exercises group.

Table 2: Correlation Between Month 2 Schirmer Test and Month 2 OSDI Results

	Aerobic Exercise	Orbital Massage
Chi-Square	6.84	14.44
P-Value	0.14	0.006

In the case of the Aerobic Exercise group, the chi-square value of 6.84 has a p-level of.14; thus, suggesting that there is no relationship between the Month-2 Schirmer test results and the Month-2 OSDI results for this group. On the other hand, the Orbital Massage group has a chi-square of 14.44, p of 0.006, indicating that there is a statistically significant relationship between the Month 2 Schirmer Test result and Month 2 OSDI result. This suggests that changes in tear production as assessed using Schirmer test are strongly related to the changes in dry eye symptoms, using OSDI score, in patients receiving orbital massage. Therefore, no correlation was identified between tear production and dry eye symptoms in the Aerobic Exercise group However, a correlation was found between these two sets of variables in the Orbital Massage group, and so conclusions could be drawn that the types of interventions differentially affect the physical health of the eyes.

Table 2, figure 1 and 2 illustrates the findings of the Mann-Whitney U test conducting to compare Schirmer Test and OSDI scores between Aerobic Exercise and Orbital Massage groups at 2nd month.

Table 3: Comparison of Schirmer Test and OSDI Results Between Treatment Groups Using Mann-Whitney U Test at 2nd Month

	Mann-Whitney U Value	P-Value
Schirmer Test	142.00	0.121
OSDI	164.40	0.341

When evaluating the same value in regards to the Schirmer Test, the Mann-Whitney U value is 142.00, $p<0.121$. $p > 0.05$ a positive inference can be easily deduced and it is concluded that there is no statistically significant difference in tear production rate between Aerobic Exercise and Orbital Massage Groups once respondents reach 2 months readout period.

To compare the severity of dry eye symptoms between the two treatment groups at time span of 2-months for the OSDI, the Mann-Whitney U value was calculated 164.40 and p-value was 0.341, thus more than 0.05, it means that there was non-significant differences between two groups.

Interestingly, both interventions seem to result in similar changes to tear production and dry eye complaints.

Figure 1: Comparison of OSDI Results Between Treatment Groups Using Mann-Whitney U Test at 2nd Month

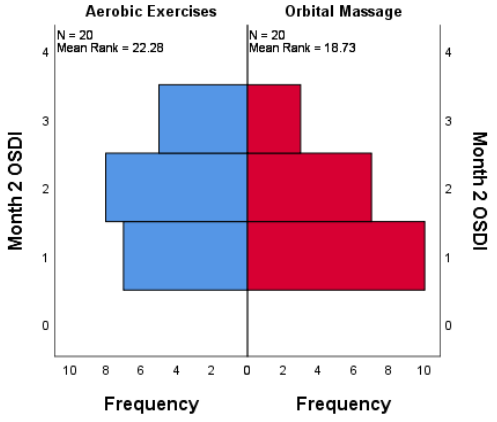
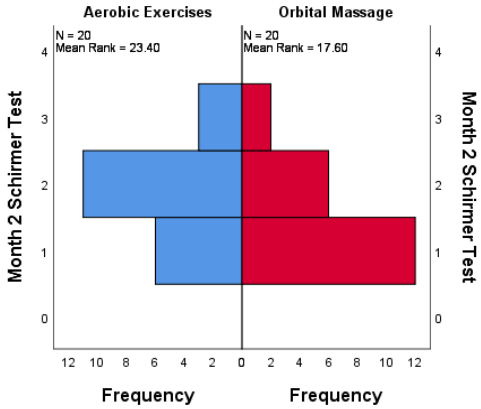


Figure 2: Comparison of Schirmer Test Results Between Treatment Groups Using Mann-Whitney U Test at 2nd Month



4. DISCUSSION

Keratoconitas, majorly facilitated by dry eye disease; a disease that results from either insufficient tear secretion, or tear evaporation, significantly interferes with an individual's quality of life.(14) New interventions such as aerobic exercises and orbital massage may be effective forms of Dry eye disease treatment. Aerobic exercises, which increase circulation and decrease inflammation, have been proven to prolong vision and sequentially help dry eyes.(15)On the other hand, orbital massage targets the exact problem, stimulation of the tear glands and the orbit, therefore being effective.

This paper aimed at [This study aimed at investigating a role and efficacy of aerobic exercises and orbital massage in treating dry eye disease based on differences in tear stimulation and symptom improvement]. In both the tesa and the blink interventions, we found a relative reduction of the dry eye symptoms within the two months of the study. These aerobic exercises yielded significantly higher improvements in visual acuity and symptoms severities than all other exercises but orbital massage that correlated strongly with tear production to symptom reduction. Such results dictate that each therapeutical option affects the system in somewhat different ways, which, in connection with the revealed differences in pathogenesis of dry eye depending on regulating factors, speaks in favor of an individual approach to its treatment.

Before engaging in line prior to studies, aerobic exercises can help in the overall well being of the eyes by increasing blood flow and decreasing inflammation to the eyes. Edwards P et. al investigated the effects of aerobic exercise on tear film stability and dry eye symptoms in old age rand determined that aerobic activity increase tear stability and decrease dry eye symptoms.(17) The present findings were therefore in agreement with this study observing a marked mean increase in tear production and overall OSDI scores at the end of the study. However, our study builds upon this research by showing that the improvements were not significantly related between the tear production and symptoms, meaning that the beneficial effects of aerobic exercises might not be undergone through other channels such as ocular blood flow and the reduction of the systemic inflammation.

In earlier studies, orbital massage has been identified to assist in tear production, as well as help combat meibomian gland disorder.In a research by Jie et al. it was found out that there is marked improvement in regards to tear production and dry eye symptom relief after the use of routine orbital massage. by Jie et al. reported that there is significant betterment in both tear production and dry eye symptoms following regular orbital massage. Consistent with these data, our study revealed that both eyes had significant improvement of OSDI scores and the correlation between tear production and symptomatic improvement was highly significant as well. This association suggests that the imperatives

offered by orbital massage might be to a greater extent aligned with the stimulation of tear production and could therefore account for the symptomatic improvement reported.

The higher mean of Month 2 Schirmer Test score in the orbital massage group indicated that the OSSDI scores are directly related with the benefit in the health of the eye. This is in contrast to the aerobic exercise group in which no correlation was seen, Thus, it can be concluded that even though aerobic exercises improve the general dry eye signs and symptoms, the mechanism of action may not be centred on improving the tear production capacity. The present study accords with earlier studies where it was postulated that the two interventions are effective but in diverse ways; while aerobic exercises may offer eye health benefits systemically, orbital massage seems to have a direct beneficial effect on the ocular surface health.[19-21]

The present investigation supports the use of both aerobic exercises and orbital massage to treat dry eye condition. Although the exercises were generally of a mildly superior improvement in overall outcome, orbital massage is noteworthy as the only intervention where we directly linked tear production and symptom reduction to ocular surface benefit. These findings of the study do help add on to literature regarding non-pharmacological management of dry eye disease and highlights the fact that treatment should be tailored to address each patient's needs and his response to them.

5. CONCLUSION

The study concludes that aerobic exercises and the orbital massage improve dry eye symptoms over two months. The present results indicate that although there are slight superior improvements in aerobic exercise programs, both treatments are essentially equally effective. The strong relationship between production of tears in eyes and symptom relief from orbital massage group can be seen to directly affecting eyesight. Both treatments show comparable overall efficacy. The significant correlation between production of tears in eyes and symptom relief from orbital massage group highlights its potential for directly benefiting eye health.

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