

Does Orthoptic Exercise Improve Convergence Insufficiency? A Prospective Study at Al-Ibrahim Eye Hospital

Orthoptic
Exercise Improve
Convergence
Insufficiency?

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ABSTRACT

Objective: To see if orthoptic exercise improves convergence insufficiency (CI).

Study Design: A Cross-Sectional Study

Place and Duration of Study: This study was conducted at the Department of Ophthalmology, Al-Ibrahim Eye Hospital, Karachi for 08 months Jan.2020 to Aug. 2020.

Materials and Methods: 60 numbers of patients suffering from CI were taken in the study after taking consent from them. The near point of convergence (NPC) and the fusional range of all the patients were measured. All patients were prescribed pencil push-up tests for one month after which all variables were reassessed. To assess the difference that orthoptic exercise had on CI patients, one-way ANOVA chi-square test was applied keeping the P-value \leq 0.05 as statistically significant.

Results: Significant difference (P-value \leq 0.05) in all measured variables after patients carried out pencil push-up tests for one month. NPC improved in all patients along with improvement in fusional amplitude.

Conclusion: It can be concluded that Orthoptic exercises had a beneficial effect on patients with CI. It is still the primary treatment option when it comes to reducing the symptoms of CI.

Key Words: Convergence insufficiency, Orthoptic Exercise, Near Point of Convergence, Pencil push-up test

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INTRODUCTION

Convergence insufficiency, often denoted only as CI, is a condition of binocular vision dysfunction, characterized by patient unable to accurately converge, or sustain accurate convergence while focusing on objects nearby. CI is associated with many ocular symptoms such as eyestrain, blurred vision, and double vision, along with other symptoms such as headaches, having to re-read, reading slowing, troubling in remembering what was read, and sleepiness^{1,2}. CI affects levels of achievement and is attributed to negative factors such as health and quality of life³. The causality for CI is typically unknown; however, the

intraocular muscles are involved in the misalignment of the eye⁴. The prevalence of Convergence Insufficiency is said to be about 4%^{5,6}. Convergence insufficiency generally presents in age sets of less than 9 years, although increase burden of near vision work and longer working hours can cause it to appear ahead of time⁷. CI can be clinically diagnosed as an exodeviation that is greater at near than at distance, a diminished near point of convergence (NPC), and redundant positive fusional vergence at near (PFV)⁸. Convergence insufficiency however common is treatable. The treatment of choice for patients with CI is intensive Orthoptic therapy⁹. Pencil push-ups and use of accommodative targets have a strong role in treatment of CI. Orthoptic exercises have been deemed as an effective means of reducing symptoms of CI and decompensating exophoria¹⁰. Pencil push-ups and base-in prism reading glasses are one of the most commonly prescribed treatments, with 87% optometrists and ophthalmologists prescribing these two treatment methods fairly consistently to patients¹¹. Due to a lack of quality of information to eye care to providers regarding CI and its improvement through Orthoptic exercises in Pakistan. A cross-sectional study was conducted at Al-Ibrahim Eye Hospital to assess the outcome of Orthoptic Exercise in patients suffering from Convergence Insufficiency.

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MATERIALS AND METHODS

After taking approval from ethical review board, an observational longitudinal study was conducted at the squint clinic of Al-Ibrahim Eye Hospital Karachi. The duration of the study was for 8 months in which 60 patients were selected based on non-probability convenience sampling technique. All the patients that were taken in this study were those patients which had a confirmed diagnosis of convergence insufficiency and were aged between 15-30 years. All patients were consented before being included in the study. For all the patients, we measured the near point of convergence (NPC) using the Royal Air Force Rule (RAF). Furthermore, the fusional range was checked with the help of prism fusional range (PFR), with the help of prisms. After measuring both of these variables, the patient was prescribing pencil push-up tests for one month after which both variables were checked once again on follow up. Data was analyzed using statistical package of social science (SPSS) Version 21.0. The entire data was continuous and presented as Mean and Standard deviation. To assess the difference of orthoptic exercise on convergence insufficiency (CI), we applied one-way ANOVA and CHI square test while keeping the P-Value <0.05 as statistically significant.

RESULTS

In this research total numbers of patients are 60, from which the most number of patients were between the age group of 15 to 20 years 28(46.7%). And the minimum number of patients is 6(1%) and their age 26 to 30 years. Out of the 60 patients, the maximum frequency of patients was females, the number of female patients is 32 (53.3%). And minimum patients are male number of patients 28(46.7%) patients.

Table 1: In this research the number of patient 60. The maximum near point of convergence in 10cm improve the number of patients were 35(58.3%) and the minimum 15cm improve the number of patients were 8(13.3%). no change in convergence after orthoptic exercise in 6 patients (10.0%).

Table No.1: Frequency and Percentage of outcome related with Orthoptic exercise pre and post Near point of convergence

Near point of convergence	Frequency	Percentage%
same	6	10.0%
5cm improve	11	18.3%
10cm improve	35	58.3%
15cm improve	8	13.3%
Total	60	100.0%

Table 2: In this research the number of patient 60. The maximum near point of convergence with glasses in 10cm improve the number of patients was 20(33.3%) and The minimum 15cm improve the number of patients was 2(3.3%). no change in convergence after orthoptic exercise in 2 patients (3.3%)

Figure 1: Shows the Percentage of Orthoptic Exercise Pre and Post Fusional Reserve near Negative and Positive. **Figure 2:** Shows the Percentage of Orthoptic Exercise Pre and Post Fusional Reserve Distance Negative and Positive.

Table No.2: Frequency and Percentage of Outcome related with Orthoptic exercise pre and post Near point of convergence with glasses

Near point of convergence with glasses	Frequency	Percentage%
same	2	3.3%
5cm improve	3	5.0%
10cm improve	20	33.3%
15cm improve	2	3.3%
Total	27	45.0%

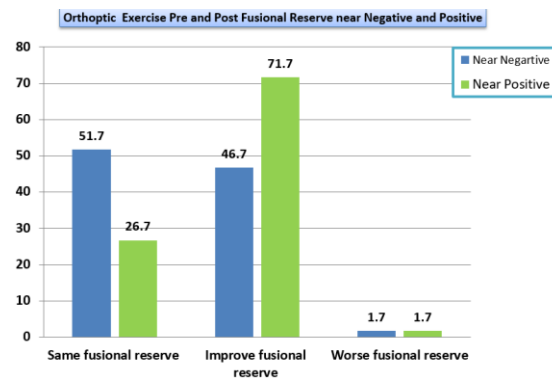


Figure No.1: Shows the Percentage of Orthoptic Exercise Pre and Post Fusional Reserve near Negative and Positive

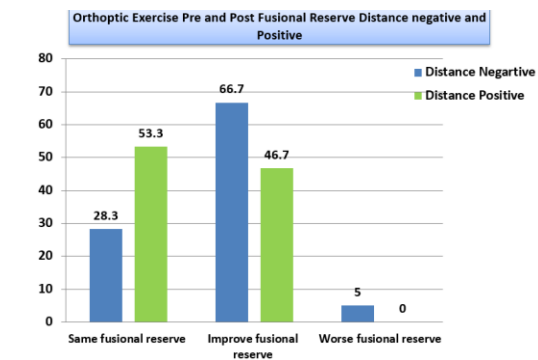


Figure No.2: Shows the Percentage of Orthoptic Exercise Pre and Post Fusional Reserve Distance Negative and Positive

DISCUSSION

Convergence insufficiency is an issue that affects the quality of life of individuals suffering from it. We conducted this study to see if orthoptic exercises have a positive impact on convergence insufficiency or not. Since the first description of CI in 1855, orthoptic exercises have been the mainstay of treating CI. It works by improving the fusional convergence in patients with CI⁽¹²⁾. In our study 35 (58.3%) patients had an improvement in near point of convergence at 10cm, whereas 8 (13.3%) had an improvement of 15cm. Near point of convergence with glasses improved in 20 (33.3%) patients at 10cm, and 2 (3.3%)

patients exhibited improvement at 15cm. Westman et al. in his study also showed that effective treatment for children and adults with CI and asthenopic symptoms is orthoptic exercises. It was also suggested that orthoptic exercises can relieve longstanding symptoms of CI⁽¹³⁾. In our study, we used pencil push-up tests as a form of orthoptic exercise and see if it can improve the NPC and symptoms of CI patients. We saw significant improvement (P-value \leq 0.05) in NPC. Similarly, another study conducted to assess if pencil push-up tests are beneficial in patients with CI also saw improvement in NPC prime fusion vergence (PFV) and reduction in the symptoms of the patients⁽¹⁴⁾. We only used pencil pushup tests to see if there is an improvement in CI, in future studies, other methods can also be used to see if it has an improvement in CI. Studies have been done on other types of orthoptic exercises to assess their effectiveness. For instance, a study was conducted to see the outcome of home-based computer orthoptic exercise program. The study concluded by stating that home-based computer orthoptic exercise program reduced symptoms of CI and had an improvement on NPC and fusional amplitudes, thus making it an effective option for treating symptoms of CI⁽¹⁵⁾. Improvements in the fusional reserve negative, fusional reserve positive, fusional reserve negative at near, and fusional reserve positive were also seen in our study showing the beneficial effects of orthoptic exercise. Another study also showed that Positive fusional vergence improved in patients undergoing orthoptic exercises, aligning with our study⁽¹⁶⁾. Overall we can conclude that orthoptic exercise is highly beneficial in improving convergence insufficiency. However, more studies can be conducted targeting different age groups and evaluating other methods besides pencil pushup tests.

CONCLUSION

The study concluded that orthoptic exercises are a strong tool in treating convergence insufficiency. Orthoptic exercises should remain the mainstay treatment in treating and reducing symptoms of CI.

Author's Contribution:

Concept & Design of Study:	Israr Ahmed Bhutto
Drafting:	Asif Mashood Qazi
Data Analysis:	Saima Majid, Attiya Zehra Rizvi, Munawwar Hussain
Revisiting Critically:	Israr Ahmed Bhutto, Asif Mashood Qazi
Final Approval of version:	Israr Ahmed Bhutto

Conflict of Interest: The study has no conflict of interest to declare by any author.

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