

Influence of an Orthoptic Exercises on Near Point of Convergence

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ABSTRACT

Objective: To evaluate the influence of Orthoptic exercise on near point of converge in patients with Convergence insufficiency (CI).

Study Design: Interventional longitudinal study

Place and Duration of Study: This study was conducted at the Eye Clinic of Al-Ibrahim Eye hospital Karachi for a period of 8 months October 2020 to April 2021.

Materials and Methods: 60 patients with confirmed diagnoses of CI were chosen for the study. All of the patients were prescribed pencil push-up tests as a form of Orthoptic Exercise to reduce CI. The pre and post Near Point of Convergence was determined and compared using the chi-square test with P-value ≤ 0.05 considered being statistically significant.

Results: Significant difference (P-value ≤ 0.001) was seen in Pre and Post Near Point of Convergence in the group without glasses and the group with glasses.

Conclusion: Orthoptic Exercises proved to be influential in improving the Near point of Convergence

Key Words: Orthoptic Exercises, Convergence Insufficiency, Near Point of Convergence

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INTRODUCTION

Convergence insufficiency (CI) is an eye related pathology in which the binocular vision is dysfunctional. It is characterized by the fact that both eyes are unable to work together while focusing on a near object thus unable to accurately converge or keep persistent convergence while focusing on a nearby object. This prevents patients from seeing a single clear image leading to many difficulties such as reading issues and sleepiness¹⁻². The condition can also be mistaken by some parents and teachers in children as a rather learning disability, instead of an actual eye disorder. CI if not accounted for affects life in a negative manner, as the health and the quality of life of individual negates substantially³.

The cause for CI is mostly related to the intraocular muscles of the eye that are the cause due to misalignment⁴. CI is said to present in age group of less than nine years and is said to have a prevalence of about 4%⁵⁻⁶. However, if there is increase stress on the eye with an increase in burden of near vision work and prolonged working hours, it can appear much earlier ahead of time⁷. Doctors can clinically diagnose CI by assessing a redundant near point of convergence (NPC)⁸. Albeit CI is a very disturbing disorder and has a definitive impact on the quality of life and the overall health of an individual, it can still be treated. The treatment of choice for most patients that is recommended by ophthalmologist is an intensive course of Orthoptic exercise therapy⁹. Orthoptic exercises are done to enhance the ocular muscles strength. Orthoptic exercises such as pencil push-ups and use of targets for accommodation have a strong role in battling CI. Orthoptic exercises reduce the symptoms related to CI and decompensate exophoria, thereby being a very effective treatment modality¹⁰. 87% of Ophthalmologists and Optometrists prescribed Orthoptic Exercises such as Pencil push-ups and base-in prism reading glasses as these two treatments have shown to be effective and have a better compliance with the patient¹¹. Pakistan lacks data concerning CI and how it improves with Orthoptic exercises. In light of this lack of data, a cross-sectional study was conducted at Al-Ibrahim Eye Hospital to assess the influence of Orthoptic exercises on the near point of convergence in patients with CI.

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MATERIALS AND METHODS

Once IRB approval was attained, an interventional longitudinal study was carried out at the eye clinic of Al-Ibrahim Eye hospital Karachi. The study spanned for a period of 8 months during which 60 patients were selected on the basis of non-probability convenience sampling technique. All the patients were diagnosed with Convergence Insufficiency by the same Ophthalmologist of which was selected to diagnose CI. All the patients were aged between 15-30 years and were thoroughly taken into confidence about their involvement in the study and that their personal data will not be revealed or publicized. Before prescribing Orthoptic Exercises, we measured the near point of convergence (NPC) using the Royal Air Force Rule (RAF). Once NPC was measured all of the participants were prescribed pencil push-up tests as a form of orthoptic exercise for one month. They were all shown how to perform it and also were asked to demonstrate it in front of them so that they may not practice it improperly at home. On one month follow up the NPC was once again checked. The NPC data was separated for individuals with glasses and those without glasses. Data was analyzed using SPSS Version 21.0. To assess the compare, the difference of NPC after orthoptic exercise, the chi-square test was applied with P-value set at ≤ 0.05 .

RESULTS

Figure 1: Shows the Percentage of Pre and Post Near Point of Convergence of Patients without Glasses

Figure 2: Shows the Percentage of Pre and Post Near Point of Convergence of Patients with Glasses

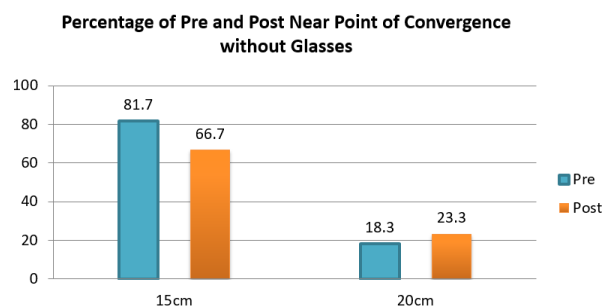


Figure No.1: Percentage of Pre and Post Near Point of Convergence without Glasses

Table No.1: Compare the Pre and Post analysis with and without glasses

With Glasses		Without Glasses	
Pre. Near Point of Convergence	Post. Near Point of Convergence	Pre. Near Point of Convergence	Post. Near Point of Convergence
≤ 0.001		≤ 0.001	

Chi-Square test applied $P < 0.05$

Table 1: Shows the analysis of Pre and Post Near Point of Convergence with and without glasses after Orthoptic Exercise. Results showed that the Pre and Post comparison of NPC in the with glasses group and the without glasses group was statistically significant P-value ≤ 0.001 .

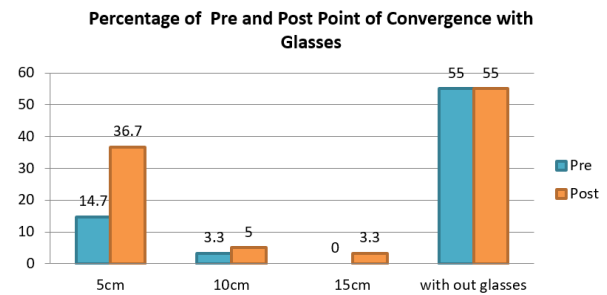


Figure No.2: Percentage of Pre and Post Near Point of Convergence with Glasses

DISCUSSION

The use of computers, smartphones, and handheld tablets have all become the norm in the day and age that we live in. All of the devices can have adverse consequences on our near vision and eventually quality of life. No age group is spared from these near vision defects and one of the more common conditions that affect our near vision is CI¹². Current literature has recognized orthoptic exercise as a scientifically proven method for treating CI with strong researches coming out of countries such as Egypt, India, Iran, and South Korea¹³⁻¹⁶. Pencil Push-ups is an easy, cost saving, and self-taught home based therapy for treating symptomatic CI¹⁷. In Our study, we used pencil push-up test as a form of orthoptic exercise to see that it can improve NPC in CI patients. There was a significant difference in the NPC pre and post treatment in both the groups (with and without glasses). Similarly, another study also showed that pencil push-ups tests are beneficial for patients with CI, as there was improvement in NPC and prime fusion vergence (PFV)¹⁸. Our study was only restrained to using one form of Orthoptic Exercise. In the future we may use other forms of Orthoptic exercise and even compare them to one another as to which one is more influential in improving symptoms and NPC. Other treatment modalities such as home-based computer Orthoptic exercise program can also improve CI symptoms and NPC, meaning that other treatment modalities exist¹⁹. A study was also conducted to see if Pencil Push-up test was more effective than office-based therapy in patients with CI, the results showed that NPC was not statistically significant meaning that there are many options available for practitioners' to use as a form of Orthoptic exercise¹³. We can conclude that our study showed positive results and that Orthoptic exercises are influential in improving NPC.

CONCLUSION

Our study showed that indeed Orthoptic Exercise improved Near Point of Convergence in patients with Convergence insufficiency.

Author's Contribution:

Concept & Design of Study: Israr Ahmed Bhutto
 Drafting: Ashique Hussain Gadehi, Imran Ali Pirzado
 Data Analysis: Ashique Hussain Gadehi, Imran Ali Pirzado, Mazhar Ali, Uroosa Memon
 Revisiting Critically: Asim Ateeq
 Final Approval of version: Mazhar Ali

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

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