Original Article

Pre and Post Fusional Reserve Assessment following Orthoptic Exercise

Assess the Pre and Post Fusional Reserve following Orthoptic Exercise

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ABSTRACT

Objective: Assess the Pre and Post Fusional Reserve Vergence (PFV) following Orthoptic Exercise.
Study Design: A Longitudinal Interventional Based Study
Place and Duration of Study: This study was conducted at the Isra Postgraduate Institute of Opthalmology and Muhammad Medical College from Oct. 2020 to April 2021.
Materials and Methods: 60 patients that had CI were selected for this study. All of the patients were taught and prescribed the pencil push-up tests as the form of Orthoptic exercise which was to be carried out to improve CI. The Pre and Post PFV was measured and compared using the Chi-Square tests, the P-value was set at P-value ≤0.05.
Results: Significant Different was seen in the Pre and Post Fusional Reserve Distance Positive (Pvalue≤0.01), Pre and Post Fusional Reserve Distance Negative (P-value=0.02), Pre and Post Fusional Reserve near Negative (P-value=0.01), and Pre and Post Fusional Reserve near Positive (P-value ≤0.01).
Conclusion: Following Orthoptic Exercise Improvement was seen in the Post Fusional Reserve Vergence. Further studies can be to assess if Orthoptic Exercise can improve Near Point of Convergence or if it can improve symptoms of CI.
Key Words: Convergence insufficiency, Post Fusional Reserve Vergence, Orthoptic Exercise, Pencil Push-up.

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INTRODUCTION

Convergence insufficiency (CI) is a relatively common binocular disorder of the eye[1]. As it is a very common and frequently arising disorder of the muscular discomfort, it needs to be given clinical significance [2]. The disorder involves around the inability of a patient to converge eyes towards and object of interest which moves from a distance to a nearby point. Patients report multiple symptoms which include fatigue to the eyes, headaches, and diplopia while reading and studying [3-4]. Patients with CI reveal an exophoria or intermittent exotropia at near, but can also exhibit orthophoria. The symptoms of CI can worsen by illness in wakefulness, long working hours, and nervousness[3]. The prevalence in The United States of America is said to be 2% of the whole population. The frequency of complains related to CI tends to increase with near work[5]. CI tends to appear earlier than expected it there is an increase burden of near work for prolonged working hours[6]. CI can be clinically diagnosed by measuring a reduced near point of convergence (NPC), and a diminished Positive Fusional Vergence (PFV) at near [7]. Treatment for CI revolves around the fact that if the patient is asymptomatic or symptomatic. The treatment of choice includes intensive Orthoptic therapy. Treatment for symptomatic patients includes base-in prism reading glasses, pencil push-ups, orthoptic vision therapy, and office-based vergence/accommodative therapy[2]. Particularly, pencil push-ups and base-in prism reading glasses are the most commonly used treatment modalities for tackling CI, with approximately 87% of Ophthalmologists and Optometrists prescribing these methods to patients[8]. Pakistan is a country filled with many eye related defects, and CI is one of them. As there is a lack of information concerning CI and its improvement through orthoptic exercise in Pakistan, a cross sectional study was done to assess the pre and post fusional reserve following Orthoptic Exercise.

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MATERIALS AND METHODS

After being granted approval from the Institutional Review Board (IRB), a longitudinal interventional based study was conducted for a period of 6 months at the Isra Postgraduate Institute of Opthalmology and Muhammad Medical College from Oct. 2020 to April 2021. 60 patients aged between 15-30 years were chosen through non-probability convenience sampling

technique. All the patients were informed about their involvement in the study through written consent. All the patients went through an eye examination by the selected Ophthalmologist, who was able to confirm the diagnosis of CI. Before patients were prescribed Orthoptic exercise in the form of Pencil Push-up test, the Pre Fusional Reserve Vergence (FPV) was measured with the help of Prism Fusional Range (PFR) using prisms. Once Pre FPV was measured, all the patients were taught Pencil Push-up test. They were all asked to demonstrate the test that they will have to perform at home so that they performed it accurately and made no errors in doing so. The patients were followed up after a month and the Post FPV was measured using the same technique. Data was analyzed and compared using SPSS Version 21.0. to assess and compare the FPV difference that Orthoptic Exercise had, The Chi Square test was carried out with statistical significance being set at ≤0.05**.**

RESULTS

Figure 1.1: Shows the Percentage of Pre and Post Fusional Reserve Distance Positive.
Figure 1.2: Shows the Percentage of Pre and Post Fusional Reserve Distance Negative.
Figure 1.3: Shows the Percentage of Pre and Post Fusional Reserve Near Negative.
Figure 1.4: Shows the Percentage of Pre and Post Fusional Reserve Near Positive.

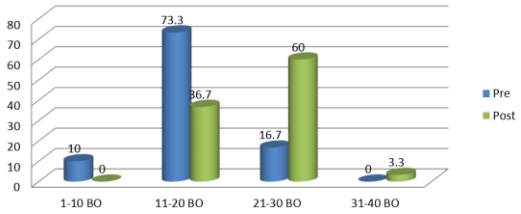

Figure No.1: Shows Percentage of Pre and Post Fusional Reserve Distance Positive

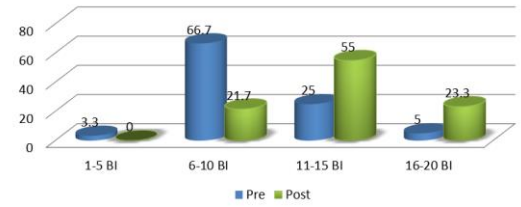

Figure No.2: Shows Percentage Pre and Post Fusional Reserve Distance Negative

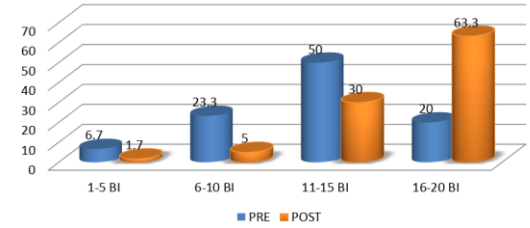

Figure No.3: Shows Percentage Pre and Post Fusional Reserve Near Negative

Table 1: Shows comparison of Pre and Post Fusional Reserve Reading from different Dimensions. Significant difference (P-value ≤0.05) was seen in all the comparisons of Pre and Post Fusional Reserve.

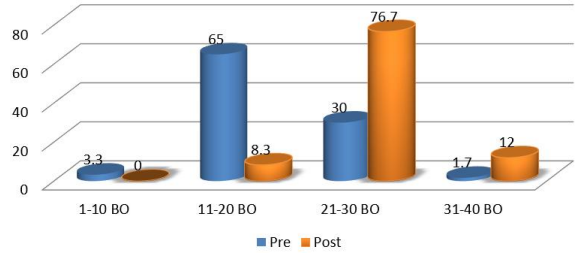

Figure No.4: Shows Percentage Pre and Post Fusional Reserve Near Positive

Table No.1: Shows Significant difference on Comparison of Pre and Post Fusional Reserve Reading from different Dimensions

Fusional Reserve Distance Positive		Fusional Reserve Distance Negative	
Pre	Post	Pre	Post
≤ 0.001		0.002	
Fusional Reserve Near Positive		Fusional Reserve Near Negative	
Pre	Post	Pre	Post
≤ 0.001		0.001	

DISCUSSION

Current reports of the frequency and prevalence of CI shows to be 2.25% and 8.3%, however earlier reports find that the incidence of data varies from 1-25%[9]. Further studies need to be done in Pakistan and across the globe to full determine the prevalence and the situation of CI on the globe. It is also necessary to find out more about the etiology of CI and to also determine if there might be a genetic predisposition to it or not. It is important to treat CI as if it is left untreated can reduce level of achievement of individuals; especially students and can create negative factors related to healthy and quality of life [10-11]. As stated earlier the treatment commonly prescribed is orthoptic exercises. In our study we used Pencil Push up as the orthoptic exercise for treating CI. We prescribed Pencil Push up due to the fact that it had a better compliance with patients and was easier to carry out[8]. Our study evaluated the Pre and Post Fusional Reserve of the Patients only, future studies can also be done to assess Near point of Convergence (NPC). There was significant difference in Pre and Post Fusional Reserve in all the parameters that was studied. This goes in line with another study in which Orthoptic exercises were done to improve CI which also demonstrated an improvement of Positive Fusional Vergence [6]. Another study supporter our finding in which just like our study used pencil push-up tests as a form of Orthoptic exercise and produced favorable results by recording an

improvement in prime fusion vergence as well as NPC[12]. Our study only used one form of Orthoptic Exercise to check for improvement in PFV, future studies can be done to assess different Orthoptic Exercises and see which produces the best improvement. Other treatment options are available for doctors and patients to try and prescribed to the patients, these methods include home-based computer orthoptic exercise programs which have been proven to improve CI[13]. Our study cements that Orthoptic Exercise can improve Post Fusional Reserve Vergence but studies need to be done to see if it reduces symptoms or not in the future.

CONCLUSION

Improvement in Post Fusional Reserve Vergence was observed in our study following Orthoptic exercise, however future studies need to be conducted to see if NPC and symptoms can also be reduced or not. Types of Orthoptic Exercises need to be pitted against each other to see which of the following the more dominant treatment modality is.

Author's Contribution:

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