

Prevalence of Convergence Insufficiency, Accommodation Insufficiency and Visual Symptoms of Convergence Insufficiency

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ABSTRACT

Objective: To determine the prevalence of convergence and accommodation insufficiency and its associated symptoms.

Materials and Methods: This descriptive cross sectional study containing 320 patients was conducted in ophthalmology department of Madinah Teaching Hospital Faisalabad. After history taking ocular examination of each subjects started from V/A followed by with and without glasses, pinhole, autorefractometry and subjective refraction. The near point of convergence and near point of accommodation were measured using 50 cm long RAF rule with rotating four sided cubes of dissimilar target. Then convergence insufficiency symptoms were found in patients through a questionnaire.

Results: The total sample n=320 subjects including males (n=119) and females (n=201) were divided into 2 groups of age ranging 15 to 25 years and 26-35 years. The percentage of normal individual without any symptoms was 53.4%. The percentage of convergence and accommodation insufficiency alone was 8.125% and 16.875% respectively. The co morbidity of both convergence and accommodation insufficiency accounted for 21.56%. The overall percentage of convergence insufficiency was 29.4% while accommodation insufficiency was seen in 38.4% patients. The frequency of major symptoms including headache, eyestrain, sleepiness, double vision, pulling feelings and read slowly were 97.9%, 96.8%, 64.9%, 43.6%, 90.4% and 36.3 % respectively.

Conclusion: There was a highly significant association of convergence and accommodation insufficiency. This study emphasizes on measuring the convergence and accommodation insufficiency along with the other refraction test and make it an integral part of routine examination.

Keywords: Binocular vision disorder, Binocular eye alignment.

INTRODUCTION

Convergence insufficiency is a typical binocular vision problem in which the eyes do not work comfortably at close.¹ Convergence insufficiency is considered as most frequent occurring binocular vision dysfunction and is characterized by the patient's inability to obtain sufficient binocular convergence without unwanted attempt². In this problem eyes have a strong tendency to drift outward (exophoria at close), remote nearKpoint ofBconvergence (NPC), decreased positive fusional vergence (PFV) and lowGAC/A ratio when doing close work³.

Convergence insufficiency may have a significant negative affect on the academicKperformance and health related quality of life.^{4,5,6} It is generally associated with symptoms such as headache, eyestrains, blurr vision, double vision (Diplopia), difficulty in concentrating, moving prints, and loss of comprehension after short periods of reading or performing near activities⁵. Vision therapy is used to improve the binocular skills in individuals with symptomatic convergence insufficiency to increase their ability to perform visual tasks more comfortably^{7,8}.

Convergence insufficiency and accommodation insufficiency have been associated with a similar symptomology and frequently present at a same time⁹. The accommodation insufficiency is a condition that affects the ability to maintain the near focus for a prolonged period of time¹⁰.The term accommodation insufficiency is usedgwhen theHaccommodative powerFis significantly lessGthan

theGnormal physiologicalGlimits for theJpatient's age. Therefore, it should not be confused with presbyopia where the physiological accommodation insufficiency is normal for the patient's age. Accommodation insufficiency is the most common cause of asthenopia.

Now a day's convergence insufficiency is a major problem because of excessive near task of usual routine. It is a binocular vision disorder because of which person can't maintain proper binocular eye alignments on objects while seeing distance to near. The aim of this study is to evaluate the prevalence of convergence and accommodation insufficiency in general population.

MATERIAL AND METHODS

This descriptive cross sectional study containing 320 patients was carried out at OPD of Ophthalmology department of Madinah Teaching HospitalLFaisalabad from March 2020 to September 2020. All the patients with age limit 15-35 whose visual acuity was at least 6/9 were included in this study. Patients with visual acuity less than 6/9, strabismic patients, amblyopic patients, any congenital diseases, any eye surgery and who were unable to understand, mentally retarded patients were excluded. Proper informed consent of each subject was taken.

Patients divided into two groups according to age. Group 1 contains subjects of age ranges from 15 to 25 years and Group 2 contains subjects of age ranges from 26 to 35 years.

Data were collected from the patients with the help of a self-designed Performa. The Performa was designed to collect information about demographic, ocular history, Snellen visual acuity with and without glasses, objective refraction, and subjective refraction, NPC and near point of accommodation. After taking proper history, ocular examination of each patient started from the assessment of the VA through Tumbling E chart at a distance of 6 meter. Visual acuity with and without glasses were recorded. At last after visual acuity a pinhole test was performed to rule out refraction and disease related problems. Objective and subjective refraction was performed. After performing subjective refraction NPC and near point of accommodation was measured by RAF Rule that is 50 cm long rule with slider holding and rotating four sided cube with different target. NPC was measured by using vertical line with central dot while for near point of accommodation letter chart was used. Patients were asked to focus on near target while moving the target slowly towards their nose. When the target was too close fusion break and exotropia become manifest. This point was also known as break point that was measured. Normal value for convergence and accommodation was considered 10 cm and 12 cm respectively. If the patient had value less than 10 cm then the patients had convergence insufficiency. Similarly, if the patient had value less than 12cm the patients had accommodation insufficiency.

SPSS version 20 was used for statistical analysis. Chi-square test was applied to explore the relationship between convergence insufficiency and accommodation insufficiency. P-value ≤ 0.05 was taken as significant.

RESULTS

The Group 1 (15 to 25) years was consists of total 205 subjects and Group 2 (26 to 35) years were contains total 115 subjects. A total sample was consisting of total 201 females and 119 males. The frequency of female was higher 62% as compared to males 37.2%. The mean and standard deviation of NPC and NPA was 8.71+3.189 and 11.83+3.247 respectively (Fig 1).

Convergence insufficiency was present in 63 subjects in Group 1 and in 31 subjects in Group 2. While

accommodation insufficiency was present in 72 subjects in Group 1 and 51 subjects had convergence insufficiency in Group 2. Similarly, convergence insufficiency was present in 67 males and in 27 females and accommodation insufficiency was present in 76 females and in 27 males (Table 1).

The frequency of convergence and accommodation insufficiency was 29.4% and 38.4% respectively. The percentage of convergence insufficiency alone was 8.125% while accommodation insufficiency found to be 16.87%. Both the convergence and accommodation insufficiency percentage was 21.56% (Table 3).

The frequency of associated symptoms of convergence insufficiency were headache 97.9%, eye strains 96.8%, sleepiness 64.9%, double vision 43.6%, pulling feelings 90.4%, blurring 78.7%, sore feeling 70.2%, read slowly 36.2% and re read the same line 66% (Fig 2).

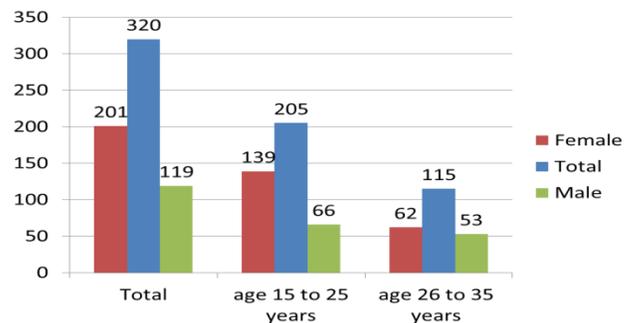


Fig 1: No. of subjects in each age group

Table 1: Frequency of convergence and accommodation insufficiency in age and gender.

	AGE		Gender	
	Group 1	Group 2	Male	Female
Convergence insufficiency	63	31	27	67
Accommodation insufficiency	72	133	27	76

Table 2: Overall Frequency of convergence and accommodation insufficiency.

	Convergence insufficiency		Accommodation insufficiency	
	Frequency	Percent	Frequency	Percent
Present	94	29.4	123	38.4
Absent	226	70.6	197	61.6
Total	320	100.0	320	100.0

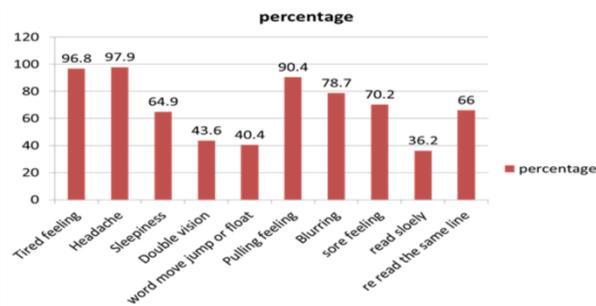


Figure 2. Frequency of convergence insufficiency Symptoms.

DISCUSSION

Now a day convergence and accommodation insufficiency is a major problem because of excessive near tasks of usual routine. Therefore convergence and accommodation measurement is the good screening test for the detection of visual symptoms in patients. The measurement of convergence and accommodation need not be time consuming or fatiguing to the patients in the performance of routine refraction. Therefore, accurate determination of the amounts of muscle function in constant use, their maximum function, their reserve power, and their relationship to one another far more important than to regulate modification of

the refractive correction by considering the position of rest alone.

In this clinical research we determined the prevalence of convergence and accommodation insufficiency among a general population and found that prevalence of convergence and accommodation insufficiency was 8.125% and 16.875% respectively. The prevalence of convergence insufficiency in worldwide is not clear because population bases studies are not available^{11, 12}. Although several studies reported the prevalence of convergence insufficiency in specific population ranging between 1.75 and 33%^{4,13}.

Dragomir et al, sapkota et al, and aziz et al showed that convergence insufficiency was more frequent in females than males^{14, 15, 16}. The results of their studies showed the similar results with my study that convergence insufficiency and accommodation insufficiency was most frequently present in females as compared to males. However, in a study performed in korea the higher prevalence of convergence insufficiency was found in males¹⁷. Another study investigates the relationship between the intensity of near work and visual complaints found an association between the amounts of near work, decreased accommodation facility and increased asthenopia.¹⁸

Regarding the frequency of accommodation insufficiency, a rate of comorbidity with convergence insufficiency not as high as suggested by Rouse nor as low as that proposed by Wajuhane. Our study analyzed the relationship between convergence insufficiency and accommodation insufficiency which showed a highly significant relationship between convergence insufficiency and accommodation insufficiency but in contrast to my study a study conducted by Marran et al,¹⁹ showed that there is no significant relationship between convergence insufficiency and accommodation insufficiency. Therefore, a further study on a larger population is necessary to verify the findings.

CONCLUSION

There was a highly significant association of convergence and accommodation insufficiency. This study emphasizes on measuring the convergence and accommodation insufficiency along with the other refraction test and makes it an integral part of routine examination.

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