A Comparison of Heterophoric Presbyopes and non Presbyopes patients in relation to near point of convergence and Fusion

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Abstract

Aim: To estimate the percentage of heterophoria, near point of convergence, positive and fusion between presbyopic and non-presbyopic patients, To determine the degree of effectiveness of age on condition of heterophoria, near point of convergence, fusion, To determine the type of heterophoria at near is that accompanied with advanced age. **Subjects and Methods**: This is a crossed sectional hospital based study, it was done at Alwaildeen eye hospital, Hundred presbyopic patients (64 females, 36 males) were enrolled in this study in the period dated from 25/1/2019 to 30/4/2019, their ages were ranged (15 – 65 years), included in this study, The vision was estimated by Snellen chart, heterophoria was measured by Maddox wing and RAF rule was used to measure near point of convergence and accommodation, Synoptophore was used to measure fusion. **Results**: The results showed that presbyopic patients with vision mean was 1+_0.0 (range 1), Near point of convergence was reduced in presbyopic patients (Mean SD 11.7 ± 1.98, range. 8 - 15) than in control group (Mean SD 6.74 ± 1.58, range. 6 - 15) Positive fusion was reduced in presbyopic patients (Mean SD 15.6 ± 5.85, range 7 - 30) than in control group(Mean SD 20.02 ± 7.81, range 4 - 40), Maddox wing was in presbyopic patients (Mean SD 3.82 ± 262, range0-10) and in control group (Mean SD 3.18 ± 2.49, range 0-12). **Conclusion**: A positive relation between age and near point of convergence, positive fusion, Maddox wing.

Keywords: Heterophoria, Near point of convergence, Positive fusion, Presbyopia, Non-presbyopia.

Introduction

Heterophoria also known as “latent squint”, is a condition where in the tendency of the eyes to deviate is kept latent by the fusion reflex when the fusion is interrupted [(1)]

Near point of convergence (NPC) is the closest point at which an object can be seemingly during bifovealvision,Its always closer than the near point of accommodation & is usually less than 8cm[(2)]

Fusionis the ability of two eyes to produce a composite picture from two similar pictures, each of which is incomplete in one small detail [(3)]

Presbyopia is a common type of vision disorder that occurs as you age. It is often referred to as the aging eye condition. Also it results in the inability to focus up close, a problem associated with refraction in the eye [(4)]. Also it is a relative term depending not only on the age but also on the refraction, It alsovaries with the individual and with his habits [(5)] As age advances, several factors combine to diminish the accommodative power, The lens becomes harder and less easily molded so that the elastic force of the capsule is no longer greater than the resistance of the lens substance [(6)]

Background of the study

Most cases come to the clinic with asthenopic symptoms and the investigation reveals presence of refractive error or standard vision.

Type of heterophoria sometimes is accompanied with advanced age.

Presbyopes may be at greater risk for near point asthenopia due to the significant decrease in convergence ability.

Objectives of Study

This study was aimed to compare the heterophorias, near point of convergence, fusion between presbyopicand

non-presbyopic patients, also to detect the degree of effectiveness of age on condition of heterophoria, near point of convergence, fusion, and to determine which type of heterophoria at near is accompanied with advanced age.

Subjects and Methods

This study was conducted to compare the heterophorias, near point of convergence, fusion between presbyopic and non-presbyopic patients, also to detect the degree of effectiveness of age on condition of heterophoria, near point of convergence, fusion, and to determine which type of heterophoria at near is accompanied with advanced age at Alwaldeen eye hospital in period from 25/1/2019 to 30/4/2019.

All patients have normal vision 6/6 and their ages were ranged from (15-65 years),The vision was examined by Snelln"s chart at a distance of 6 meter, Refraction was done by Auto refract meter which an instrument for determining refractive state of the eye, Cover test was done by occluder which an opaque rounded disc with a handle that used to detect type of phoria, The heterophoria was measured by Maddox wing and RAF rule was used to measure near point of convergence and Synoptophore was used to measure fusion.

Results

Table 1 Demographic Data

	Presbyopic Patients	**Control Groups**
Data	**Freq (%)**	**Freq (%)**
Gender		
Male	18 (36%)	13 (26%)
Female	32 (64%)	37 (74%)
Age		
Mean ± SD	46. ±14.98	23.5 ±5.17
Range	40 - 65 years	15 - 30 years
Vision		
Mean ±SD	1 ± 0.0	1 ± 0.0
Range	1	1
Refractive State		
Hypermetropia	20 (20%)	7 (7%)
Myopia	2 (2%)	17 (17%)
Astigmatism	78 (78%)	74 (74%)
Emmetropia		2 (2%)

Table 2 shows the distribution of Maddox wing measurement according to presbyopic patients

MWT	Frequency	Percent
0	2	4
2	26	52
4	7	14
5	2	4
6	3	6
8	8	16
9	1	2
10	1	2
Total	50	100
Mean SD	3.82±2.62	
Range	0-10	

Table 3 shows the distribution of Maddox wing measurement according to control group

MWT	Frequency	Percent
0	5	10
1	1	2
2	25	50
3	1	2
4	9	18
6	3	6
7	1	2
8	4	8
12	1	2
Total	50	100
Mean SD	3.18±2.49	
Range	0-12	

Table 4 distribution of near point of convergence

	Presbyopic Patients		Control groups	
NPC	Frequency	Percent	Frequency	Percent
6-10	19	38	49	98
>10	31	62	1	2
Total	50	100	50	100
Mean±SD.	11.7±1.98		6.74±1.58	
Range	8-15		6-15	

6-10 normal NPC, >10 convergence insufficiency

Paired sample t-test illustrated that is a significant difference between near point of convergence in presbyopic patient and control group P value 0.000

Table 5 distribution of positive fusion

	Presbyopic Patients		Control Groups	
Fusion	Frequency	%	Frequency	%
1-15	31	62	17	34
>15	19	38	33	66
Total	50	100	50	100
Mean±SD.	15.6±5.85		20.02±7.81	
Range	7 - 30		4 - 40	

1-15 weak fusion, >15 normal fusion - P value 0.005**.**

Paired sample t-test demonstrated significant difference between fusion positive in presbyopic patient and control group P value 0.005.

Table 6 correlation between age and positive fusion

	Presbyopic Patients 40-63 years		Control Groups 15-30 years	
Variable	R	P-value	R	P-value
Fusion positive	-0.089	0.539	-0.332	0.018*

Table 7 correlation between age and near point of convergence

	Presbyopic Patients 40-63 years		Control Groups 15-30 years	
Variable	R	P-value	R	P-value
Near point of convergence	0.366	0.009**	0.287	0.043*

Table 8 correlation between age and Maddox wing

	Presbyopic Patients 40-63 years		Control Groups 15-30 years	
Variable	R	P-value	R	P-value
Maddox wing	0.176	0.220	0.289	0.042*

Person correlation showed there a positive relation between age and near point of convergence in presbyopic patients r 0.366 P value 0.009, then in control group there a negative relation between age and positive fusion r -0.332 P value 0.018 then positive relation of age with near point of convergence and age with Maddox wing 0.287 P value 0.043, r 0.289 p value 0.042 respectively.

Table 9 correlation between positivefusion with Maddox wing

	Presbyopic Patients 40-63 years		Control Groups 15-30 years	
Variable	R	P-value	R	P-value
Fusion positive	-0.278	0.054	-0.233	0.123

Table 10 correlation between near point of convergence with Maddox wing

	Presbyopic Patients 40-63 years		Control Groups 15-30 years	
Variable	R	P-value	R	P-value
Near point of convergence	0.255	0.077	0.059	0.685

Table 11 correlation between near point of convergence and positive fusion.

	Presbyopic Patients 40-63 years		Control Groups 15-30 years	
Variable	R	P-value	R	P-value
Fusion positive & NPC	-0.243	0.092	0.281	0.051

Discussion

This study showed that patients were divided in to two groups, presbyopic patients (18 of them were males36% and 32 females 64%) and control group (13 were males 26% and 37 females 74%).

The study showed all patients were in normal vision 6/6 with mean 1±0.0. The study showed that refractive state of presbyopic patients was 20% hypermetropia, 2% Myopia, 78% stigmatism, and refractive state of control group was 7% hypermetropia, 17% Myopia, 74% stigmatism.

The measurement of the Maddox wing showed there is no significant differences between presbyopic patients(3.82+-2.62) and control group(3.18+-2.49)P value 0.221, this is does not agree with David(w.w.w.myoclinic.org//com) who said that presbyopes increasing exophoria with age at near.

The measurement of near point of convergence illustrated there is a significant differences between presbyopic patients (11.7±1.98) and control group(6.74±1.58) P value 0.000 and this is agree with David(w.w.w.myoclinic.org//com) who said that is a significant differences at near were found for near point of convergence between presbyopic

and non- presbyopic patients.

The measurement of positive fusion demonstrated there is a significant differences between presbyopic patients (15.6±5.85) and control group (20.02±7.81) P value 0.005, this is agree with David (w.w.w.myoclinic.org//com) who said that is a significant differences at near were found for positive fusion between presbyopic and non-presbyopic patients.

Person correlation showed there is a positive relation between age and near point of convergence in presbyopic patients r 0.366 P value 0.009then in control group there a negative relation between age and positive fusion r -0.332 P value 0.018 then positive relation of age with near point of convergence and age with Maddox wing 0.287 P value 0.043, r 0.289 p value 0.042 respectively.

The study showed there is no relation between positive fusion and Maddox wing in presbyopic patients(r -0.278 P value 0.054) and control group (r -0.233 P value 0.123).

Also the study showed there is no relation between near point of convergence and Maddoxwing in presbyopic patients(r 0.225 P value 0.077) and control group (r 0.059 P value 0.685).

The study also showed there is no relation between positive fusion and near point of convergence in presbyopic patients (r -0.243 P value 0.092) and control group (r 0.281 P value).

Conclusion

Presbyopes may be at greater risk for near point asthenopia due to the significant decrease in convergence ability and accommodation ability, There is a positive relation between age and near point of convergence in presbyopic patients, There is a negative relation between age and positive fusion in control group, There is a positive relation between age and near point of convergence and Maddox wing, Most cases with advanced age were exophoric patients.

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