The Difference between two minus lens and push –up methods in calculation accommoduction

(The best method in calculation accommoduction)

Mohamen Samir *1, Hassan Al-Mawy² and Hassain Salim³

^(1,2,3) Department of optics Techniqnes, Dijla University College, Al- Masafi Street, Al-Dora Baghdad – 0094, Iraq.

Corresponding author E- mail (*): Mohaemensamir@duc.edu.iq

Abstract

Several studies are exploring the possibility that people who are already nearsighted, have unusually high levels of aberration or show greater adaptive delays. The main aim of this project is to calculate accommodation & its effect on hypermetropic & myopic subjects Were had been 80 cases in a normal state but of her cases, 34 were myopic and hypermetropic when examination found differences between the amount of accommodation in hypermetropic and myopic. In myopic, the patients were very comfortable because have a high degree of accommodation, but in hypermetropic the patients had a low amount of accommodation because it has little accommodation and cannot uses at the high degree when we examine the accommodation amplitude.

Keywords: Amplitude of Accommodation (AA) royal RAF ruler (RAF).

الفرق بين طريقة العدستين السالبة وكذلك مطرة التكيف لقياس سعة التكيف البصري م.م. مهيمن سمير عارف¹ ، حسن الماوى² وَ حسين سالم³

الخلاصة

تستكشف العديد من الدر اسات احتمال أن الأشخاص الذين يعانون من قصر النظر بالفعل لديهم مستويات عالية بشكل غير عادي من الانحراف أو يظهرون تأخيرات تكيفية أكبر. الهدف الرئيسي من هذا المشروع هو حساب الإقامة وتأثيرها على الأشخاص الذين يعانون من فرط التحمل وقصر النظر كانت هناك 80 حالة في حالة طبيعية ولكن في حالاتها ، كانت 34 حالة قصر نظر ومتضخمة عندما وجد الفحص اختلافات بين مقدار التكيف في فرط التحلل وقصر النظر . في قصر النظر ، كان المرضى مرتاحين للغاية لأن لديهم درجة عالية من الإقامة ، ولكن في حالة فرط التحمل ، كان لدى المرضى قدر منخفض من التكيف لأنه يحتوي على القليل من أماكن التكيف ولا يمكن استخدامه بدرجة عالية عندما نفحص سعة التكيف

الكلمات المفتاحية : سعة التكيف، مسطره التكيف .

Introduction

Accommodation is the process by which the eye changes to maintain a sharp image of an object as its distance changes. In this, distances vary for individuals from (the maximum distance from the eye for which a clear image of an object can be seen), to the near point (the minimum distance for a

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clear image This phenomenon of the eyes adjusting from seeing the second target from double to single within seconds is due to the eyes' change in optical power. The young human eye can change focus from a far distance to as near as 6.5 cm from the eye. This dramatic change in focal length of the eye of approximately 15 diopters occurs as a consequence of a reduction in zonular tension induced by ciliary muscle contraction The amplitude of accommodation comes down with age. After 45 years of life, the accommodative amplitude can come down so that the near point of the eye is more remote than the reading distance. After 45 years of life, the accommodative amplitude can come down so that the near point of the eye is more remote than the reading distance, when this occurs, the patient is presbyopia. Those who are emmetropic eyes (who do not require optical correction for distance vision) will need an optical aid for near vision. Those who are myopic (nearsighted and require an optical correction for distance vision), will find that they see better at near without their distance correction; and those who are hyperopic (farsighted) will find that they may need a correction for both far vision and near vision. The age-related come down in accommodation occurs almost universally to less than 2 diopters by the time a person reaches 45 to 50 years, by which time most of the population will have noticed a decrease in their ability to focus on close objects and hence require glasses for reading or bifocal lenses. Accommodation decreases to about 1 diopter at the age of 70 years [1-10].

1-1-1 MECHANISM AND AIM OF THE STUDY

A. mechanism of accommodation

Light from the environment is brought to focus on the retina by the combined optical power of the cornea and the lens. The convergence of both eyes is such that the near object is in focus, which aids in image projection on the fovea. This action involves contraction of the medial rectus muscles of both eyes, with the relaxation of lateral recti resulting in the adduction of both the eyes. Constriction of the sphincter pupillae muscles, and pupils constrict, which improves the depth of focus. The divergent rays from distant objects scatter off the periphery of the cornea, and hence they do not fall on the fovea. Contraction of bilateral ciliary muscles results in increased thickness of the lens, which shortens the focal length, and increases its refractive power (measured in diopters) [11-13].

Aim of Study to study and compute the accommodation and its effect on the refractive error, hypermetropia, and myopia by using the minus lens method. Computation is the maximum amount of accommodation that eyes are capable of producing individually or together.

The Amplitude of accommodation

Accommodation measurement of the focusing range in young eyes is usually interpreted as an index of maximum accommodation potential, although it is well known that subjective amplitudes of accommodation are higher than objectively measured optical changes due to the inclusion of depthof-focus effects. The amplitude of accommodation declines progressively with age, and the onset of presbyopia is generally defined as the point where one's subjective amplitude of accommodation falls below 3.00 D. When assessed monocularly in healthy eyes, the subjective amplitude decreases to a minimum value of 1.00 to 2.00 D at about the age of 55 years Figure.1. [13-18]

Theories of Accommodation

Helmholtz's theory

The most widely held theory of accommodation is that proposed by Hermann von Helmholtz in 1855. When viewing a far object, the ciliary muscle relaxes allowing the lens zonules and suspensory ligaments to pull on the lens flattening it the source of the tension is the pressure that the vitreous and aqueous humor exert outwards onto the sclera [13-20].

When looking at a near object, the ciliary muscles, hold to resist the outward pressure on the sclera causing the lens to slacken which allows the lens to spring back into a thicker, more convex, Figure2 [21-24].



Fig. (1): Accommodation amplitude with age.

Schachar theory

Schachar's theory of accommodation introduced the use of scleral expansion bands Figure2. Presbyopia is due to growth in equatorial diameter, which leads to a decrease in periventricular space. Contraction of ciliary muscle cannot tense zonules and expand lens carnally [25-27].

Cotenary theory

The catenary (hydraulic suspension) theory proposes that the lens, zonules & anterior vitreous comprise a diaphragm between the aqueous and vitreous Figure2. As ciliary muscle contracts, it forms a pressure gradient, causing anterior movement of lens zonules diaphragm and increasing anterior central curvature. Presbyopia is due to an increase in lens volume, which results in reduced response to pressure gradient created by ciliary body contraction. [25-29].



Fig. (2): Theories of Accommodation.

Materials & Methods

1. Push Up Method, Push Up Method, monocularly or binocularly determine the maximum amount of accommodation that eyes are capable of producing. By RAF rule metal rod, test chart, wing-like support that fits over the nose and rests against lower orbital margins. The patient was instructed to keep the testing letters as clear as possible and monitor when it was unclear. Quick the patient to clear the target stop when the patient can no longer clear the testing letters within 2 to 3 seconds of viewing. monitor the diopters points on the near point rod that corresponds with the unclear Procedure. [30-35]

2. Minus lens method/Sheard's method

Both eyes are tested monocularly first, then binocularly tested with full refractive correction worn by the patient. Procedure Minus lenses are added progressively till the target can be seen clearly or the patient first reports the nuclear Power of the concave lens. [30-39].

Results and Discussion

The data have been analyzed and organized statistically by (One sample t-test and chi-square). The aim of the current study is to study and calculate the accommodation and its effect on the refractive

error: hypermetropia and myopia. Table 1 has a demographic description of the study for normal patients. Table 2 has a demographic description of the study for abnormal patients.

Age *Gender Cross tabulation							
			G				
			Fem ale	Male	Total		
Age	below	Count	1	1	2		
	15	% Of Total	1.3%	1.3%	2.5%		
	16-25	Count	13	17	30		
		% Of Total	16.3%	5 21.3%	37.5%		
	26.25	Count	16	23	39		
	20-33	% Of Total	20.0%	28.7%	48.8%		
	above	Count	4	5	9		
	36	% Of Total	5.0%	6.3%	11.3%		
Total		Count	34	46	80		
		% Of Total	42.5%	57.5%	100.0%		

Table (1): Demographic description of the study (age and gender) for normal patients.

Table (2): Demographic description of the study (age and gender) for <u>abnormal</u> patients.

Age *Gender Crosstabulation						
			Gender		Total	
			Female	Male	Total	
	holow	Count	1	3	4	
Age	15	% Of Total	2.0%	6.0%	8.0%	
	16-25	Count	8	8	16	
		% Of Total	16.0%	16.0%	32.0%	
	26-35	Count	8	16	24	
		% Of Total	16.0%	32.0%	48.0%	
	above 36	Count	2	4	6	
		% Of Total	4.0%	8.0%	12.0%	
Total		Count	19	31	50	
		% Of Total Count	38.0%	62.0 %	100.0%	

Table (3): The statistical description of the accommodation amplitude according to the age group for normal patients.

One sample test							
Accommodation Amplitude							
	Ν	Mean	Std. Deviation	P.value			
below 15	2	6.3750	0.53033				
16-25	30	8.6750	1.74092	0.04 5			
26-35	39	7.9038	1.44597	0.04 5			
above 36	9	8.7778	1.16890				

Table 3 have showed the statistical description of the Accommodation Amplitude according to the age group for normal patients, and makes the mean for each age group {(below 15), (16-25), (26-35), and (above 36)} in the same order {(6.3750), (8.6750), (7.9038) and (8.7778)}. respectively at p.value for each age group.

Table (4): Statistical description of the variable according to the refractive error <u>for abnormal</u> patients.

Group Statistics						
	refractive error	N	Mean	Std. Deviatio n	P.value	
Accommodation	Hypermetropic	13	8.5385	1.77906	0.06 NS	
Ampitude	Myopia	37	10.533	11.05591	0.04 S	
V.A.R.E	Hypermetropic	13	1.7115	1.20263	0.01 HS	
	Myopia	37	-1.2973	0.94802	0.03 S	
VALE	Hypermetropic	13	1.1731	0.73161	0.01 HS	
	Myopia	37	-1.0473	0.90108	0.04 S	

Table 4 have shown a statistical description of the variable (accommodation amplitude, visual acuity to the right eye V.A.R.E and visual acuity to the left eye V.A.L.E) according to the refractive error for abnormal patients. There will be divided some variables into some categories. Refractive error (Re. Er) divided into (Hypermetropic and Myopia) And made a mean for hypermetropic accommodation amplitudes (8.5385) and myopia accommodation amplitude (10.5338), hypermetropic V. A R. E (1.7115), and myopia V. A R. E (-1.2973), hypermetropic V. A L. E

(1.1731), and myopia V. A L. E (-1.0473), respectively at p.value for each data that divided into (non-significant, significant, high significant).

As the results for normal patients show the accommodation amplitude according to the age group for normal patients in below 15 years is 6.3750, 16-25 year is 8.6750, 26-35 year is 7.9038 above 36 year is 8.7778. Discussing the results for abnormal patients shows, that the accommodation of hypermetropic patients varied from (5.50-10.25D), and in the myopic patients (5.50 – 11.75D). The difference between the myopic and hypermetropic cases was not statistically significant. During the eye examination, there were 6 males and 7 females in hypermetropic cases.

Conclusion

The main aim of the study is to calculate accommodation and its effect on hypermetropia and myopia. The subject we discover in 130 cases, 80 cases are normal patients 42.5% are female and 57.5% are male, 50 cases are abnormal patients 38% female 62% male. In the range of ages 10-39 years old we summarize in normal patients below 15 years the amplitude of accommodation (AA) Is (6.3750) and in (16-25) is (8.6750) and (26-35) is (7.9038) and above 36 years is 8.7778. By reviewing abnormal patients there were 37 myopic patients and 13 hypertrophic, it was found accommodation in hypertrophic patients (5.50-10.25) and accommodation in myopic patients (5.50-11.75). The difference was not statistically significant. However, hyperopia females aged 14-38 years old showed low values of accommodation. In myopic, found there was no need for accommodation however in hypertrophic found an amount that needs to accommodate.

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