بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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Evaluation of Fusion and Stereopsis in Anisometropic Patients

Thesis

Submitted for Partial Fulfilment of Master degree in Ophthalmology

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Rana Mohamed Mahadel

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List of Abbreviations

Abb.	Full term
$\chi 2$	Chi square test.
3D	Three dimensions.
AA	Amblyobic anisometropic
Arc SEC	Seconds of arc.
ARC	Abnormal retinal correspondence.
BCVA	Best corrected visual acuity
BSV	Binocular single vision
Cm	Centimeter.
D	Diopter.
IOL	Intra ocular lens.
JAAPOS	Journal of American Association for Pediatric Ophthalmology and Strabismus.
LASIK	Laser assisted in situ keratomileusis.
LT	Left.
M	Meter.
Max	Maximum.
Min	Minimum.
N	Number of patients.
NA	Non amblyopic anisometropic patients.
no	Number.
P	P value.
RT	Right.
SD	Standard deviation.
SE	Spherical equivalent.
SER	Spherical equivalent refractive difference.
SMP	Simultaneous macular perception.
SPSS	Statistical Package for the Social Sciences.
VA	Visual acuity.
VEP	Visual evoked potential.
Z	Mann Whitney test.

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INTRODUCTION

Vision has three types: monocular: vision with one eye, bi-ocular: no coordination between both eyes, binocular: coordination between both eyes. (1)

Any living creature having two eyes using them together to view a single image is said to have binocular vision. Creatures with binocular vision have many advantages over creatures with only a single eye or creatures who are not able to use their eyes together. (2)

Binocular meaning is taken from Latin word **bini**, meaning two, and **oculus**, meaning eye. So, means two eyes focusing on one visual image. (3)

Humans' eyes are both set on the front of the face, permitting binocular single vision(BSV), using their both eyes help them to have a clear, will defined, and single three-dimensional (3D) image. (4)

Any defect of vision from one eye will affect binocularity and loss of advantages of BSV over being monocular. (5)

Binocular vision anomalies are among the most common visual disorders. They are usually associated with symptoms such as headaches, eye strain, eye pain, blurred vision, and double vision. There are many reasons binocular vision might

become reduced or lost like anisometropia, cataract, and strabismus in which patient Loses coordination of movement between the two eyes. (6)

Anisometropia is type of ametropia.Ametropia means visual disorders caused by errors in the refractive power of the eye. However, emmetropic eye means normal eye with normal refractive power where a point at an infinite distance from the eye is conjugate to the retina and light rays focus directly on the retina, whereas in ametropia, the light rays are not able to do so. Hence the vision becomes blurred. (7)

In anisometropia there is difference in refractive power between both eyes unlike isometropia whereas there is a refractive error in both eyes but symmetrical. Anisometropia will give rise to blurred image of one eye more than the other so lead to difficulty in fusing both images by brain and severity may reach neglecting stimuli from one eye leading to amblyopia, that means deprivation of BSV and experience monocular vision with deterioration of BSV functions as fusion and stereopsis.(5)

The main result of Binocular vision impairment often is partial or total loss of stereoscopic vision and binocular depth perception. (6)

So good assessing of BSV and trying to save binocularity is the way to save the good quality of the vision.

Aim of the Work

The aim of our study is to evaluate fusion and stereopsis in anisometropic patients with or without amblyopia.

Chapter 1

BINOCULAR SINGLE VISION

Binocular vision is a type of vision in which humans are able to perceive a single 3D image of their surroundings. Thus binocular vision means fusion, the blending of vision from the two eyes form a single percept figure 1 [3] i.e. simultaneous vision of two seeing eyes when fixing an object. [4]

Manfred Fahle a neurological researcher has declared six characteristics of having two eyes rather than just one. It allows a spare eye in case one eye is lost, and provides a wider field of view, for example, humans have nearly a maximum horizontal field of view about 190:200 degrees with two eyes, though it is 100 degree temporal and 60 nasal by one eye. [2]

He also added that Binocular vision has a great advantage which is stereopsis that occurs due to the different positions of our two eyes on the head providing binocular disparity that lead to having a vision with depth of perception. Besides binocular vision allows the angles of the eyes' lines of sight relative to each other (vergence), and those lines relative to a particular object (gaze angle) to be obtained from the images in the two eyes this may allow disparity that helpful for stereopsis, figure1 [3]. Binocular vision help in masking any part of defective vision in one eye visual field by the other eye field. For instance, blind spot, and according to this fact Leonardo da