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MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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Effect of Axial Length on Full-Field and Multifocal Electroretinogram

Thesis

Submitted for Partial Fulfillment of the Master Degree in ***Ophthalmology***

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List of Abbreviations

Abb.	Full term
AL	Axial length
BCVA	Best corrected visual acuity
cds/m2	Candela per square meter
CRT	Cathode ray tube
ERG	Electroretinography
Ff-ERG	full field electroretinography
Hz	Hertz
IOP	Intraocular pressure
ISCEV	International society for clinical electrophysiology of vision
KOhm	Kilo Ohm (unit of electric resistance)
LCDs	Liquid crystal displays
LogMAR	Logarithm of minimal angle of resolution
Mf-ERG	Multifocal electroretinography
ms	Millisecond
nV/deg2	Nanovolt per degree squared
QN1	Quadrant N1 wave
QP1	Quadrant P1 wave
QRD	Quadrant response density
RN1	Ring N1 wave
RP1	Ring P1 wave
RRD	Retinal response density
SD	Standard deviation
SE	Spherical equivalent
uV	Microvolt

ABSTRACT

Background: The Electroretinogram is a mass potential, which reflects the summed electrical activity of the retina. Full-field ERG measures the electrical signals from the whole retina in response to a light stimulus. The weakness of the full-field ERG is that it cannot provide topographical information regarding the functional integrity of the retina and cannot detect subtle functional defects. The response is dominated by the peripheral retina due to its predominance of retinal cells. **Aim of the Work:** to investigate the effect of axial length on fullfield (ffERG)and multifocal ERG (mfERG). **Subjects and Methods:** Forty-four eyes of 44 healthy subjects were included in this case series study which has been conducted at Ain shams university hospitals after the approval of the research ethical committee in the faculty of medicine, Ain Shams University between July 2018 and September 2019. Full ophthalmologic examination was performed for all participants, including visual acuity assessment (Best corrected visual acuity) using Snellen chart, calculation of spherical equivalent (SE), slit Lamp biomicroscopy examination with IOP measurement via Goldmann applanation tonometry (GAT), and fundus examination by indirect ophthalmoscope or via 90 D VOLK lens to assess macular area. Axial length measurement, ffERG & mf-ERG. **Results;** We found that in the absence of fundus changes, mfERG parameters showed decreased amplitudes with increase in axial length. The Six-Rings Response Densities showed negative correlation with AL while there is no significant correlation between Six- Rings Response Densities and SE. The Six-Rings P1 Amplitude showed negative correlation with AL while there is no significant correlation between P1 Amplitude and SE. The Six- Rings N1 Amplitude showed negative correlation with AL while there is no significant correlation between P1 Amplitude and SE. The four quadrant Response Densities showed negative correlation with AL while there is no significant correlation between four- quadrant Response Densities and SE. The four- quadrant P1 Amplitude showed negative correlation with AL while there is no significant correlation between P1 Amplitude and SE. The four- quadrant N1 Amplitude showed negative correlation with AL while there is no significant correlation between P1 Amplitude and SE. There is no significant correlation between full-field clinical ERG parameters and both AL and SE. **Conclusion:** In the absence of fundus changes, mfERG parameters showed decreased amplitudes with increase in axial length. For correct interpretation of ERG responses in clinical practice, we recommend consideration of axial length measurement when evaluating mfERG responses.

Key words: Axial Length, Full-Field, Multifocal Electroretinogram

INTRODUCTION

Electroretinographic (ERG) responses provide objective quantification of retinal function. It is used to assess the function of retinal tissue. For example, ERG may be used to assess photoreceptors, neuronal cells (horizontal, bipolar, amacrine cells), and glia cells and their interaction. The full-field electroretinogram (ff-ERG) measures the whole function, whereas multifocal electroretinogram (mf-ERG) measures local function of the retina ***(Ramya Sachidanandam, Priya Ravi, Parveen Sen, 2013)***

In normal eyes, ERG responses are influenced by various factors such as age ***(Gerth et al., 2003; Marmor et al., 2009),*** media opacities ***(Hood et al., 2012)***, systemic medications ***(Sen et al., 2010; Melles and Marmor, 2014)***, axial length ***(Westall et al., 2001)*** and refractive error ***(Park et al., 2013)***.

The axial elongation in myopia has been reported to produce retinal stretching ***(Logan et al., 2004)***, retinal thinning ***(Wakitani et al., 2003)***, reduced retinal cell density, enlarged photoreceptor inner segments ***(Kawabata and Adachi-Usami, 1997)*** and alteration of the regular arrangement of retinal neurons, which affects the signal transmission among different retinal layers ***(Crewther, 2000)***.