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ORIGINAL ARTICLE

Macular retinal sensitivity using MP-1 in healthy Malaysian subjects of different ages

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KEYWORDS
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Age

Abstract
Purpose: To determine the influence of age and gender on macular sensitivity to light in healthy subjects of 4 age groups using the MP-1 microperimeter.
Methods: A prospective study was carried out on 50 healthy subjects (age range: 18–60 years) divided into 4 age groups; 18–30 years, 31–40 years, 41–50 years and 51–60 years. Full-threshold microperimetry of the central 10° of retina was performed utilizing 32 points with the MP-1. Macula area was divided into four quadrants, which were superior nasal (SN), inferior nasal (IN), inferior temporal (IT) and superior temporal (ST).
Results: Total mean sensitivity at 10° for age groups 18–30 years, 31–40 years, 41–50 years and 51–60 years were 19.46 ± 0.30, 19.40 ± 0.39, 19.47 ± 0.35 and 18.73 ± 0.75 (dB), respectively. There was a significant difference in total mean retinal sensitivity at 10° and at the four quadrants with age but not for gender. The retinal sensitivity was highest in the IT quadrant and lowest in the SN quadrant for all age groups. The linear regression analysis revealed that there was a 0.019 dB, 0.016 dB, 0.022 dB, 0.029 dB and 0.029 dB per year age-related decline in mean macular sensitivity within the central 10° diameter in the SN, IN, IT and ST quadrants respectively.
Conclusion: Among normal healthy subjects, there was a linear decline in retinal light sensitivity with increasing age with the highest reduction in the superior nasal quadrant and lowest in the inferior temporal quadrant.

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PALABRAS CLAVE
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MP-1;
Sensibilidad retiniana;
Edad

Sensibilidad macular retiniana utilizando el microperímetro MP-1 en sujetos sanos Malayos de diferentes edades

Resumen
Objetivo: Determinar la influencia de la edad y el sexo en la sensibilidad macular a la luz en sujetos sanos de cuatro grupos de edad, utilizando el microperímetro MP-1.
Métodos: Se llevó a cabo un estudio prospectivo en 50 sujetos sanos (rango de edad: 18-60 años), divididos en cuatro grupos de edad; 18-30 años, 31-40 años, 41-50 años y 51-60 años. Se realizó una microperimetría de umbral completo de los 10° centrales de la retina, utilizando 32 puntos con el sistema MP-1. El área macular se dividió en cuatro cuadrantes: superior nasal (SN), inferior nasal (IN), inferior temporal (IT) y superior temporal (ST).
Resultados: La sensibilidad media total a los 10° para los grupos de edad de 18-30 años, 31-40 años, 41-50 años y 51-60 años fue de $19{,}46 \pm 0{,}30$, $19{,}40 \pm 0{,}39$, $19{,}47 \pm 0{,}35$ y $18{,}73 \pm 0{,}75$ (dB) respectivamente. Se produjo una diferencia significativa de la sensibilidad retiniana media total a los 10°, y en los cuatro cuadrantes, asociada a la edad pero no al sexo. La sensibilidad retiniana fue superior en el cuadrante IT y menor en el SN en todos los grupos de edad. El análisis de la regresión lineal reveló una disminución anual asociada a la edad de la sensibilidad macular media de 0,019 dB, 0,016 dB, 0,022 dB, 0,029 dB y 0,029 dB dentro del diámetro central de 10° en los cuadrantes SN, IN, IT y ST respectivamente.
Conclusión: Entre los sujetos sanos normales, se produjo una disminución lineal de la sensibilidad retiniana a la luz al incrementar la edad, produciéndose la mayor reducción en el cuadrante superior nasal y la menor en el cuadrante inferior temporal.

Introduction

Various conventional perimeters are currently used during clinical examination to map the central visual fields, which includes the macular area. However, the precision of evaluation of macular area by conventional perimeters is often insufficient. This is because the accuracy of the conventional visual field is based on the assumption that the patient's fixation during the examination time is always stable and located at the center of the fovea.

Although the Humphery Field Analyser (HFA) can be used to assess central macular sensitivity, it is unable to quantify retinal thresholds accurately over small and discrete retinal lesions. The scanning laser ophthalmoscope (SLO), instead, is able to achieve an exact correlation between macular and corresponding functional defects but it is very time consuming, cumbersome and does not facilitate automated follow-up examinations.[1] The MP-1 microperimeter, however, measures accurately retinal sensitivity within the central field, even in patients with unstable or extrafoveal fixation, unlike other standard perimeters.[2] A recent study has revealed that microperimetry can detect more retinal functional damage then standard automated perimetry.[3]

In patients with macular diseases, microperimetry allows precise mapping of the central visual sensitivity, and provides a good correlation between fundus pathology and the fundus abnormalities.[4] Recent publications have shown that the MP-1 is clinically useful in various central retinal pathologies.[5,6]

However, normative data according to age for the retinal light sensitivity are limited. To date, four studies have reported data on normal subjects. One study[7] reported the normative data for 37 healthy subjects (66 eyes) of age range 19–71 years. However, the age distribution of the subjects was not mentioned in their study. A recent study[8] reported normative data in 190 healthy Italian subjects (190 eyes) between the ages of 20 and 75 years. There were another 2 studies[9,10] which reported retinal sensitivity data in normal subjects although it was not the main objective of the study.

Histological and retinal image studies of the nerve fiber layer in eyes with increasing age suggest that the number of ganglion cells subserving macula function is reduced with increasing age.[11] In addition, color perception and visual acuity seem to be reduced with increasing age.[12,13]

The aim of this study was to evaluate and compare the retinal light sensitivity in four age groups of healthy subjects using the MP-1 microperimeter and to investigate the influence of age and gender.

Methods

Study design and ethics

This prospective study was approved by the Universiti Kebangsaan Malaysia Research and Ethics Committee. Informed consent was obtained from all participants prior to the commencement of the study.

Subjects

The study was performed on 50 healthy Malay individuals who came for a routine ocular examination at the