Retinal Screening of Coats Disease Using Electroretinography

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Abstract:

Background: Coats is a retinal disorder causing dilation of blood vessels in the human retina. The present study aims to measure electroretinography (ERG) in patients suffering from Coats disease.
Material and Methods: 11 (20 eyes) male patients suffering from Coats were selected for the present study. Electroretinography was measured in the patient group using the Mangoni machine. The result was compared with the 11 (22 eyes) normal population following the ERG test. SPSS version 22 was used for this purpose.
Results: The case and control groups were not significantly different in age, while a significant difference was observed in Best corrected visual acuity. BCVA between the two groups. Furthermore (110.98.63 ± and 93.09 ± 8.04 in control and case respectively), the difference between the mean amplitude of ERG, b wave was statistically significant as far as patient and normal groups were concerned.
Conclusion: Coats disease damages the retina, which can be measured by the amplitude of ERG, b wave.
Keywords: Coats Disease; Retina; Electroretinography.

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Introduction

Coats disease is an idiopathic retinal vascular disorder with retinal telangiectasia with intraretinal and / or subretinal exudation without appreciable retinal or vitreal traction.

There are different diagnostic techniques to look for pathological changes of the visual system. Electrophysiological testes are among these techniques. Visual evoked potential (VEP), electrooculography (EOG), and electroretinography (ERG) are the most common electrophysiological techniques of the visual system.

Sarzaeim F et al (2022) evaluated the side effects of anti-seizure medications on the visual pathways in 20 patients aged 15-30 years using VEP. They found out that the latency of VEP, P100 peak was delayed in the patients under anti-seizure drug treatment, reflecting the visual pathway disturbances in the patients [1].

Shushtarian S.M et al. (2017) extensively researched the effect of occupational vibration on the visual pathways of 50 workers exposed to heavy vibration in a textile factory using VEP. They concluded that the visual pathway of workers gets affected by occupational vibration, which could be diagnosed by the VEP test [2]. Several studies have shown the utility of VEP in different pathological changes in the visual system [3-10].

The retina is a part of the visual system in which EOG and ERG are the usual techniques used to examine the pathological condition of the retina.

Tajik et al. (2018) investigated the utility of EOG for diagnosing amiodarone toxicity on the retina in patients with cardiac disorders using amiodarone. They found that retina get affected in these patients, which could be measured by the Arden index (AI) of the EOG technique [11].

Allahdady F (2016) studied the effectiveness of the EOG technique for the early detection of hydroxychloroquine toxicity in the retina of patients with juvenile rheumatoid arthritis, which showed the usefulness of the EOG technique in this regard and could be measured by AI [12].

Sarzaeim F et al (2022) assessed the effect of hand-arm vibration created by the road drilling machines on 12 male workers using ERG. They concluded that occupational hand-arm vibrations in road drilling machine operators have adverse effects on the human retina, which can be measured by the amplitude of ERG, b peak [13].

Finally, Shustarian et al. (2008) conducted a study on retinal damages in turner workers exposed to intraocular foreign bodies (IOFB) using ERG. They found that the patient group's ERG patterns were changed compared to the control group, which is a clue for the usefulness of ERG for this purpose [14]. Several studies have been conducted on the application of ERG in different pathological conditions of the retina [15-17].

Considering the above literature review, a study was designed to survey the retinal changes observed in Coats disease using ERG.

Material and Methods

11 (20 eyes) male Coats patients aged 35-50 were selected for the purpose of present study. E-chart, ophthalmoscope, and retinoscope were used to evaluate the patient's visual system. 11 normal male populations with the same age range were selected as the control group.

Electroretinography was recorded in all participants in the case and control groups. Amplitude (μr) and latency (msec) of ERG b wave was measured for total subjects using a B M 6001 (BioMedical Mangoni Pisa, Italy)

Table 1: Demographic findings in case and control group

Variable	Number of participants	groups (Mean ± SD)		P value*
		Control	Case	
Age	11	41.90 ± 5.3	41.45 ± 5.08	0.847
Visual Acuity (LogMar)	11	0 ± 0	0.088 ± 0.057	0

* Based on Mann-Whitney U Test

Table 2: Measurement of mean latency and Amplitude of ERG, b wave in case and control groups

Variable	Number of participants	groups (Mean ± SD)		P value*
		Control	Case	
Latency (msec)	11	43.63 ±1.59	43.9 ±1.57	0.556
Amplitude (μv)	11	110.9 ±8.63	93.09 ±8.04	0

* Based on Mann-Whitney U Test

capable of recording electroretinography (ERG). Conventional electrode attachment was used to record ERG in each subject. The results obtained in the two groups were compared in two groups. SPSS version 22 was used for the statistical analysis.

We used mean and standard deviation values to present our data. Kolmogorov- Smirnov test was used for the evaluation of the normality of data. T-test was used for normal variables and Mann-Whitney for not normal variables to describe differences between study groups. We performed the statistical analysis using SPSS software version 22 (IBM, Armonk, NY, USA). P values less than 0.05 were considered significant. In a web-based sample size calculator

analysis the power of the study was > 99 % with an alpha level 0.05

Results:

Table 1 shows the demographic findings in the health and coats disease groups . There was no statistically significant difference between the two groups regarding age (P value = 0.847), whereas a significant difference was observed in BCVA (P < 0.001).

Table 2 shows the measurement for amplitude and latency of ERG wave in health and coats disease groups.

There was a statistically significant difference regarding the amplitude of the ERG, b wave between the heathy and coats disease group. (P <0.001), whereas the difference between the two groups in terms of latency of ERG, b wave was not statistically significant.

Discussion

Coats is a rare disease characterized by abnormal development of the blood

vessels in the retina (retinal telangiectasia). Electroretinography (ERG) was used in the present research study to screen the retina of the patients suffering from Coats disease. It was observed that ERG, b wave amplitude was reduced in these patients. It is well-known that ERG, b wave amplitude originates from bipolar and muller retina cells [18]; thus, these retina layers get damaged in patients with Coats disease. The following studies may support the result of the present work.

Bohm MRR et al. (2011) reported a case of Coats disease. This report deals with the treatment and improving visual outcome; however, they reported reduced electroretinographic amplitude (photopic and scotopic conditions), which did not significantly change during the follow-up [19].

Goel N et al. (2020) measured multifocal ERG in patients with Macular telangiectasia (Mac tel) type 2. They observed MFERG parameters changes in patients in comparison with the control group [20].

Ledolter AA et al. (2018) measured pattern ERG and full-filed ERG in 35 eyes from 18 patients with Mac tel 2. They found ERG changes in some patients [21]

Finally, Oakda M et al. (2018) measured full-field ERG in Mac Tel 2 patients, and the result was normal full-field ERG in all eyes of patients group [22], which contradicts the present study.

Conclusion

Coats disease can affect certain retina layers, which can be diagnosed by ERG, b wave amplitude.

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