



ARCHIVOS DE LA SOCIEDAD ESPAÑOLA DE OFTALMOLOGÍA

www.elsevier.es/ofthalmologia



Review

Smooth pursuit eye movements and schizophrenia: Literature review[☆]



J.G. Franco*, J. de Pablo, A.M. Gaviria, E. Sepúlveda, E. Vilella

Hospital Universitari Institut Pere Mata. Universitat Rovira i Virgili, Centro de Investigación Biomédica en Red de Salud Mental, CIBERSAM, Institut d'Investigació Sanitària Pere Virgili, IISPV, Reus, Tarragona, Spain

ARTICLE INFO

Article history:

Received 2 October 2013

Accepted 9 February 2014

Available online 26 September 2014

Keywords:

Smooth pursuit

Schizophrenia

Phenotype

Biological markers

Neuro-ophthalmology

Neuropsychiatry

Neuropsychology

ABSTRACT

Objective: To review the scientific literature about the relationship between impairment on smooth pursuit eye movements and schizophrenia.

Methods: Narrative review that includes historical articles, reports about basic and clinical investigation, systematic reviews, and meta-analysis on the topic.

Results: Up to 80% of schizophrenic patients have impairment of smooth pursuit eye movements. Despite the diversity of test protocols, 65% of patients and controls are correctly classified by their overall performance during this pursuit. The smooth pursuit eye movements depend on the ability to anticipate the target's velocity and the visual feedback, as well as on learning and attention. The neuroanatomy implicated in smooth pursuit overlaps to some extent with certain frontal cortex zones associated with some clinical and neuropsychological characteristics of the schizophrenia, therefore some specific components of smooth pursuit anomalies could serve as biomarkers of the disease. Due to their sedative effect, antipsychotics have a deleterious effect on smooth pursuit eye movements, thus these movements cannot be used to evaluate the efficacy of the currently available treatments.

Conclusion: Standardized evaluation of smooth pursuit eye movements on schizophrenia will allow to use specific aspects of that pursuit as biomarkers for the study of its genetics, psychopathology, or neuropsychology.

© 2013 Sociedad Española de Oftalmología. Published by Elsevier España, S.L.U. All rights reserved.

[☆] Please cite this article as: Franco JG, de Pablo J, Gaviria AM, Sepúlveda E, Vilella E. Movimientos de seguimiento ocular lento y esquizofrenia: revisión de la literatura. Arch Soc Esp Oftalmol. 2014;89:361-367.

* Corresponding author.

E-mail address: josefranco11@hotmail.com (J.G. Franco).

Movimientos de seguimiento ocular lento y esquizofrenia: revisión de la literatura

R E S U M E N

Palabras clave:

Seguimiento ocular uniforme
Esquizofrenia
Fenotipo
Marcadores biológicos
Neurooftalmología
Neuropsiquiatría
Neuropsicología

Objetivo: Revisar la literatura científica sobre la relación entre las alteraciones en los movimientos oculares de seguimiento lento y la esquizofrenia.

Métodos: Revisión narrativa de la literatura que incluye artículos históricos, reportes sobre investigación básica y clínica, revisiones sistemáticas y meta-análisis sobre el tema.

Resultados: Hasta el 80% de los pacientes con esquizofrenia tienen alteraciones en los movimientos de seguimiento ocular lento. A pesar de la diversidad de protocolos de evaluación, el 65% de los pacientes y de los controles son clasificados correctamente por su rendimiento global durante dicho seguimiento. Los movimientos de seguimiento ocular lento dependen de la capacidad de anticipar la velocidad del blanco y de la retroalimentación visual, así como del aprendizaje y la atención. La neuroanatomía implicada en el seguimiento lento se superpone en alguna medida con la de ciertas zonas de la corteza frontal relacionadas con algunas características clínicas y neuropsicológicas de la esquizofrenia, de modo que algunos aspectos específicos de la alteración en el seguimiento lento podrían servir como biomarcadores de la enfermedad. Como consecuencia de su acción sedante, los antipsicóticos tienen un efecto deletéreo sobre los movimientos de seguimiento ocular lento, por lo que dichos movimientos no pueden usarse para valorar la eficacia de los fármacos disponibles en la actualidad.

Conclusión: La evaluación estandarizada de los movimientos de seguimiento ocular lento en la esquizofrenia permitirá utilizar aspectos específicos de dicho seguimiento como biomarcadores para el estudio de su genética, psicopatología o neuropsicología.

© 2013 Sociedad Española de Oftalmología. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

Introduction

Schizophrenia is a chronic disease that affects nearly 1% of the population and has a negative impact on individual performance at the personal, social and labor level. In this disease, thought content and forms are altered as well as perception, psychomotricity and emotional expression.¹ Alterations in smooth pursuit eye movements have been represented in several studies on schizophrenia more than other variables such as minor physical anomalies or reduced gray matter.¹ Up to 80% of patients with the disease and 50% of their first-degree relatives exhibited difficulties in smooth pursuit eye movements.^{2,3}

In order to explain said movements, let us imagine a situation in which an individual is watching a bird in flight, which induces ocular movements to follow the movement and keep it in focus. The function of slow pursuit movements is to maintain the retinal image of a moving object within the fovea, in contrast with saccadic (brief and fast) movements which have the aim of redirecting the gaze. Both types of movements can supplement each other, as saccadic movements have the ability to correct deviations during slow pursuit.⁴

Neuro-ophthalmological research in psychiatry is over one century old. In 1908, Diefendorf and Dodge published their pioneering study on "ocular reactions" in psychiatric patients by means of "photochronographs" which used photographic recordings.⁵ The group led by Holzman (1973) was the first to study smooth pursuit movements using electro-oculogram (EOG) in patients with schizophrenia.^{2,6,7}

Knowledge about the physiology of ocular movement, obtained by means of studying primates (including humans with brain injuries), can shed light on the physiopathology of mental disorders.⁷ In addition, alterations in smooth pursuit movement could serve as biomarkers in schizophrenia.⁶⁻⁸ A biomarker is an objective indicator of the particular condition of an organism, i.e., a verifiable characteristic in the presence of a specific disease which otherwise would be absent.^{7,8} Biological markers are useful because on the one hand they can be the basis for clinical tests to divide the population between healthy and unhealthy individuals, while on the other hand they could provide information about the severity and evolution of patients.⁸

The present article is a review of scientific literature on the relationship between smooth pursuit eye movement alterations and schizophrenia.

Functional neuroanatomy and cognitive processes of smooth pursuit movements

Smooth pursuit movements involve transformation mechanisms at the sensory-motor and cognitive level. Pursuit is maintained due to 2 factors, i.e., prediction (anticipation) of the speed of the target and visual feedback on performance. The combination of these 2 elements of information (retinal and extra-retinal) involves the entirety of various channels.^{4,9}

During the first 50–100 ms (initiation or open phase), ocular pursuit is directed by information on the movement received through the eyes and therefore involves the use of sensory

Download English Version:

<https://daneshyari.com/en/article/4008328>

Download Persian Version:

<https://daneshyari.com/article/4008328>

[Daneshyari.com](https://daneshyari.com)