



Association of ocular diseases with schizophrenia

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Abstract

Background: To study the association of ocular diseases with schizophrenia. **Materials & methods:** A total of 100 subjects were enrolled. The age of subject was 20-35 years. Ocular neurovascular diseases diagnosed with psychiatric disorder as schizophrenia were included. Control groups without psychiatric disorders were included. The data was collected and result was analysed using SPSS software. **Results:** A total of 100 subjects were enrolled. The presence of previous glaucoma was significantly associated with a higher risk of schizophrenia with p- value 0.02. Among the different types of glaucoma, glaucoma suspect 3 (6) with p- value 0.05 and open-angle glaucoma 1 (2) with p- value 0.02 showed significant associations with schizophrenia. **Conclusion:** Ocular neurovascular diseases, especially glaucoma, were associated with increased risks of schizophrenia.

Keywords: schizophrenia, glaucoma, ocular diseases.

DOI Number: 10.48047/NQ.2023.21.3.NQ33005

NeuroQuantology2023;21(3): 46-49

Introduction

Visual processing impairments are well established in schizophrenia, including abnormalities in contrast sensitivity, various excitatory and inhibitory functions including those involved in masking and surround suppression and form and motion processing.¹⁻³ There has been little work on color processing to date, but clinical reports indicate frequent descriptions of increased intensity, or alterations in color perception.^{4,5} One study reported a 62% incidence of visual distortions in schizophrenia, with brightness, contrast, and motion increases being the most commonly reported.⁶ Visual distortions also had the highest predictive validity, among all basic symptoms, for conversion to a psychotic disorder and visual distortions in help-seeking adolescents are associated with suicidal ideation, even after controlling for age, gender, depression, thought disorder, paranoia, and auditory distortions.^{7,8} Finally, visual impairments contribute substantially to poorer real-world functioning in people with schizophrenia.⁹

Microvasculature of the retina is easily observed and shares the same morphological, physiological,

and pathological properties as the cerebral vasculature, making the eyes ideal “windows” for evaluating central nervous system disorders.¹⁰ According to previous investigations, retinal vascular change or degeneration was associated with cerebral diseases such as Alzheimer’s and Parkinson’s disease.¹¹ Visual changes are common in schizophrenia. Several authors have described perceptual distortions of colors, the intensity of light, and shapes, especially in the early stages of the illness.^{12,13} Difficulties in face recognition; misreading the facial expressions of others; misidentifying individuals as people known earlier in life; and believing that one’s parents have been replaced (Capgras syndrome) have also been described. Such reports suggest that parts of the visual tract—eyes, optic tract, and occipital cortex—may be involved in the schizophrenia disease process.¹⁴ Hence, this study was conducted to study the association of ocular diseases with schizophrenia.



Materials & methods

A total of 100 subjects were enrolled. The age of subject was 20-35 years. Ocular neurovascular diseases diagnosed with psychiatric disorder as schizophrenia were included. Control groups without psychiatric disorders were included. Control groups and schizophrenia were divided. The number of subjects were 50 in each. The data was collected and result was analysed using SPSS software.

Results

A total of 100 subjects were enrolled. The presence of previous glaucoma was significantly associated with a higher risk of schizophrenia with p- value 0.02. Among the different types of glaucoma, glaucoma suspect 3 (6) with p- value 0.05 and open-angle glaucoma 1 (2) with p- value 0.02 showed significant associations with schizophrenia. However, no significant associations were observed between other ocular neurovascular diseases or negative control and schizophrenia. The p- value for dry eye syndrome was 0.7.

Table 1: Association between each ocular disease and the risk of schizophrenia

Ocular disease	Number of schizophrenia (%)	control	p- value
Glaucoma	2 (4)	9 (18)	0.02
Dry eye syndrome	4 (8)	3 (6)	0.7
Diabetic retinopathy	1 (2)	3 (6)	0.5
Negative control exposure			
Retinal detachment	1 (2)	1 (2)	0.5
Blepharitis	3 (6)	5 (10)	0.2

Table 2: association of glaucoma with schizophrenia

Ocular disease	Number of schizophrenia (%)	Control	p- value
Glaucoma	2 (4)	9 (18)	0.02
Glaucoma suspect	3 (6)	2 (4)	0.05
Open- angle glaucoma	1 (2)	1 (2)	0.02
Closed- angle glaucoma	1(2)	3 (6)	0.6
Undetermined glaucoma	4 (8)	3 (6)	0.05

Discussion

Glaucoma was once considered to be a disease related to elevated intraocular pressure but is now viewed as a neurodegenerative disease.¹⁵ It was also associated with ocular perfusion pressure and vascular dysfunction.¹⁶ A previous study reported that glaucoma was associated with anxiety, depression, and sleep disturbance, and the severity of glaucoma was a predictor of psychiatric disorder.¹⁷ Another large-scale population-based study showed a significant association between glaucoma and anxiety/depression.¹⁸ However, most of those studies consisted of a cross-sectional design and failed to clarify temporality. A previous retrospective study found that veterans with severe mental illness (schizophrenia, schizoaffective disorder, BD, and other psychosis) had an elevated risk of ocular diseases, including cataracts and glaucoma.¹⁹ Hence, this study was conducted to study the association of ocular diseases with schizophrenia.

In the present study, a total of 100 subjects were enrolled. The presence of previous glaucoma was

significantly associated with a higher risk of schizophrenia with p- value 0.02. Among the different types of glaucoma, glaucoma suspect 3 (6) with p- value 0.05 and open-angle glaucoma 1 (2) with p- value 0.02 showed significant associations with schizophrenia. A study by Liu CH et al, studied patients aged ≥ 20 and were diagnosed between 1997 and 2013. Ocular neurovascular diseases diagnosed between 1997 and 2006 and newly diagnosed psychiatric disorders including bipolar disorder (BD), major depressive disorder (MDD), and schizophrenia between 2007 and 2013 were registered. A total of one million sampled patients in the database were categorized based on their diagnoses; 2243 (37.4% men) were categorized into the BD group, 10,110 (35.2% men) into the MDD group, and 1623 (43.1% men) into the schizophrenia group. In the BD group, all glaucoma (OR 1.49, [1.18–1.89]), open-angle glaucoma (OR 2.08, [1.34–3.24]), and closed-angle glaucoma (OR 2.12, [1.36–3.33]) showed statistical significance of risk. In the schizophrenia group, only all glaucoma (OR 1.47, [1.02–2.11]), glaucoma suspect (OR 1.88, [1.01–3.49]), and



open-angle glaucoma (OR 2.19, [1.13–4.26]) showed statistical significance.²⁰

In the present study, no significant associations were observed between other ocular neurovascular diseases or negative control and schizophrenia. The p-value for dry eye syndrome was 0.7. Another study by Ross DE et al, studied 93 normal comparison subjects and 59 schizophrenic patients. Also, the schizophrenic patients' smooth-pursuit eye movements were tested in response to a 0.3-Hz sinusoidal target by means of infrared oculography. They were divided into those with (N=18) and without (N=41) eye tracking disorder by using a previously described method, which was based on mixture analysis of the distribution of position root mean square error. The patients with eye tracking disorder had significantly worse performance than the patients without eye tracking disorder with respect to sensory integration, and the effect size was moderate to large. Although neurological signs were present generally in schizophrenia, poor sensory integration is particularly pronounced in patients with eye tracking disorder. A review of the literature shows that the two abnormalities have strikingly similar patterns of validators, including 1) familial aggregation, 2) premorbid presence, 3) syndromal specificity, 4) trait status, and 5) association with the deficit syndrome. Poor sensory integration and eye tracking disorder in schizophrenia may be various manifestations of a common, underlying pathophysiological process.²¹ Shiloh et al reported that the temperature of the cornea in drug-free individuals with schizophrenia is significantly higher than those on antipsychotic medication or normal controls.²² They also reported that the corneal temperature fluctuated with the patients' symptoms.²³ Human body temperature is thought to be influenced by dopamine levels, perhaps by its effect on the hypothalamus.²⁴ Congenitally blind people have a markedly decreased rate of schizophrenia, although recent studies suggest this is only true if the cause of the blindness is cortical, not in the eye.^{25,26} A variety of other eye abnormalities have been described in individuals with schizophrenia. Karson et al reported that drug-free individuals with schizophrenia have an increased blink rate.²⁷ Electrophysiological studies using visual evoked potentials have shown deficits in visual processing and perceptual organization.²⁸

Conclusion

Ocular neurovascular diseases, especially glaucoma, were associated with increased risks of schizophrenia.

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