Prevalence of Glaucoma in Patients With Vitiligo

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PRACTICE **POINTS**

- Patients with vitiligo may exhibit pigmentary abnormalities of the iris and retina.
- Normal-tension glaucoma may develop in patients with vitiligo.
- Glaucoma progresses slowly and may lead to vision loss; as a result, dermatologists should be alert to the presence of glaucoma in vitiligo patients.

Vitiligo is an acquired idiopathic disease characterized by depigmented maculae and melanocytic destruction. We determined the prevalence of glaucoma in 49 patients who had presented to the dermatology polyclinic with vitiligo and compared that with the prevalence of glaucoma in 20 age- and sex-matched healthy controls. All patients were given an ophthalmologic examination to identify any glaucomatous changes. In the vitiligo group, 9 patients (18.4%) were found to have signs of normal-tension glaucoma (NTG), while there were no signs of NTG in the control group. This difference between the 2 groups was statistically significant (P=.04). Because glaucoma can cause permanent vision loss when left untreated, its greater prevalence among patients with vitiligo suggests that these patients should be carefully monitored.

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Vitiligo is an acquired idiopathic disease of unknown etiology. Characterized by depigmented maculae and melanocytic destruction, it usually presents in childhood or young adulthood. The incidence of vitiligo ranges from 0.5% to 2% globally and there is no racial or gender predilection.[1]

Patients with vitiligo may exhibit pigmentary abnormalities of the iris and retina.[2] Noninflammatory depigmented lesions of the ocular fundus observed in vitiligo indicate a local loss of melanocytes.[1] The fact that melanocytes are present not only in the skin and roots of the hair but also in the uvea and stria vascularis of the inner ear may explain the ophthalmologic disorders that accompany vitiligo.[3] The term *glaucoma* refers to a large number of diseases that share a common feature: a distinctive and progressive optic neuropathy that may derive from various risks and is associated with a gradual loss of the visual field. If the disorder is not diagnosed and treated properly it could cause blindness.

Glaucoma is classified on the basis of the underlying abnormality that causes intraocular pressure (IOP) to rise. Glaucoma is first divided into open-angle and angle-closure glaucoma; glaucoma associated with developmental anomalies is then subdivided according to specific alterations.[4]

A PubMed search of articles indexed for MEDLINE using the terms *vitiligo* and *glaucoma* revealed only 1 study examining the incidence of glaucoma in patients with vitiligo.[5] In the study reported here, we

determined the presence of and possible risk factors for glaucoma in patients with vitiligo who had presented to the dermatology polyclinic.

Methods

We registered 49 patients diagnosed with vitiligo by clinical and Wood light examination and 20 age- and sex-matched healthy controls. Patients who were using topical corticosteroid treatments for vitiligo lesions located on the face were excluded from the study due to the glaucoma-inducing effects of corticosteroids. Similarly, patients who received drugs with sympathetic and parasympathetic action that can cause glaucoma were excluded.

The patients received a comprehensive ophthalmologic examination that included visual acuity testing, refraction, IOP measurement, gonioscopy, and fundus examination. All patients and controls underwent visual field tests and optic nerve head analyses using a confocal scanning laser ophthalmoscope. Glaucoma was diagnosed based on fundus examination, IOP measurement, field of vision evaluation, and optic nerve head analysis.

Informed consent was obtained from all participants. The research protocol was approved by the university hospital ethics committee.

Results

The study registered a total of 49 patients with vitiligo (28 female; 21 male) and 20 healthy controls (10 female; 10 male) with a variety of demographic and clinical characteristics (Table 1).

Mean (SD) IOP values were 13.83 (2.84) mm Hg for the right eye and 13.89 (2.60) mm Hg for the left eye in the vitiligo group. Values were 14.35 (2.56) mm Hg and 14.95 (2.92) mm Hg, respectively, in the control group. The IOP differences between the 2 groups were not statistically significant ($P>.05$).

Nine patients (18.4%) in the vitiligo group were found to have signs of normal-tension glaucoma (NTG). Optic nerve damage and vision loss occurs in the presence of normal IOP in NTG. There were no signs of NTG in the control group. Normal-tension glaucoma was diagnosed in the vitiligo group based on glaucomatous optic disc appearance, visual field defects, and structural analysis of the entire optic

Table 1.

Demographic Characteristics of the Patient and Control Groups

	Vitiligo Group (n=49)	Control Group (n=20)[a]	*P* Value[a]
Gender, n	Female: 28; male: 21	Female: 10; male: 10	*P*>.05
Mean age (SD), y	21.65 (12.2)	27.00 (14.0)	*P*>.05
Mean duration of disease (SD), y	6.00 (4.43)		
Family history, n (%)	12 (24.5)	0 (0)	*P*>.05
Autoantibody positivity, n (%)	2 (4.1)	0 (0)	*P*>.05
Involvement, n (%)	Acral: 20 (40.8); generalized: 25 (51.0); segmental: 4 (8.2)		
Periorbital involvement, n (%)	24 (49.0)		
Treatment, n (%)	Topical: 21 (42.9); phototherapy: 7 (14.2)		
NTG, n (%)	9 (18.4)	0 (0)	*P*=.04
Mean (SD) IOP, mm Hg	Right eye: 13.83 (2.84); left eye: 13.89 (2.60)	Right eye: 14.35 (2.56); left eye: 14.95 (2.92)	*P*>.05

Abbreviations: NTG, normal-tension glaucoma; IOP, intraocular pressure.
[a]Not all parameters are available for the control group.

nerve head in confocal scanning laser ophthalmoscope. The NTG difference between the vitiligo and control groups was statistically significant (P=.04).

In the vitiligo group, of the 9 patients who had NTG, 6 had periorbital vitiligo lesions; the remaining 3 had none. Although patients who had periorbital lesions had a higher rate of glaucoma relative to the patients without periorbital lesions, the difference was not statistically significant (P>.05).

No statistically significant differences (P>.05) were found between patients with vitiligo with and without glaucoma in terms of age, sex, disease duration, family history of vitiligo, presence or absence of periorbital involvement, manner of involvement, percentage of the involved body areas, and IOP (Table 1).

Comment

Glaucoma is characterized by increased IOP, visual field loss, and changes in the optic nerve head. Although elevated IOP is common in ocular hypertension as well as in glaucoma, there is no glaucomatous visual field loss in ocular hypertension. In NTG, on the other hand, glaucomatous visual field loss and optic nerve head changes occur without an increase in IOP.[6] Normal-tension glaucoma is a particular type of open-angle glaucoma. It is believed that NTG and high-tension glaucoma induce optic nerve head damage through different means.[7] Alternative theories have been put forth to account for the glaucomatous damage to the optic nerve head that occurs in NTG, despite normal or close to normal IOP. These theories include vascular disorders (eg, ischemia, which interrupts the orthograde or retrograde axonal transport), excessive accumulation of free radicals, triggering of apoptosis, and low resistance of lamina cribrosa.[8]

Although there are various studies exploring ocular symptoms in patients with vitiligo,[9-15] only 1 study has examined the incidence of glaucoma in this group of patients.[5] Biswas et al[11] examined ocular signs in 100 patients with vitiligo and found that 23% of patients had hypopigmented foci in the iris, 18% had pigmentation in the anterior chamber, 11% had chorioretinal degeneration, 9% had hypopigmentation of the retinal pigment epithelium, 5% had uveitis, and 34% were evaluated as normal. In this study, the authors concluded that there was a strong relationship between vitiligo and eye diseases.[11] When Gopal et al[9] compared the eye examinations of 150 vitiligo patients and 100 healthy controls, they found uveitis, iris, and retinal pigmentary abnormalities in 16% of the vitiligo patients (P<.001).

Rogosić et al[5] examined the incidence of glaucoma in 42 patients with vitiligo and found primary open-angle glaucoma in 24 (57%) patients. The patients had a mean age of 56 years, mean disease duration of 13 years, and mean IOP of 18 mm Hg for the right eye and 17.5 mm Hg for the left eye. The incidence of glaucoma was significantly higher in patients with vitiligo (P<.001) and increased with disease duration.[5]

Similar studies, however, have failed to show a relationship between vitiligo and glaucoma. In a study that evaluated the retinal pigment epithelium and the optic nerve in patients with vitiligo, Perossini et al[10] found that the fundus examination of the patients was perfectly normal.

In our study, we detected NTG in 18.4% of patients with vitiligo. We did not find a significant statistical difference between patients with and without glaucoma (Table 2). Rogosić et al[5] found a significant relationship between age and glaucoma incidence, but we did not find such a relationship,

Table 2.

Demographic and Clinical Characteristics of the Patients With and Without Glaucoma in the Vitiligo Group

	With Glaucoma (n=9)	Without Glaucoma (n=40)	*P* Value
Mean age (SD), y	26.22 (11.3)	20.62 (12.33)	P>.05
Mean disease duration (SD), y	8.22 (5.67)	5.50 (4.03)	P>.05
Mean IOP (SD), mm Hg	Right eye: 14.88 (2.36); left eye: 13.77 (2.72)	Right eye: 13.60 (2.91); left eye: 13.92 (2.61)	P>.05

Abbreviation: IOP, intraocular pressure.

which we believe is because the mean age of our patients was lower than the prior study.

In vitiligo, melanocytes are destroyed through an unknown mechanism. Although the cellular and molecular mechanisms causing melanocytic destruction have not yet been determined, various hypotheses have been put forward to explain the etiopathogenesis of vitiligo. Among these, the most commonly held hypotheses are the neural, self-destruction, and autoimmune hypotheses.[16]

Based on the observation that stress and serious trauma could precipitate or trigger the onset of vitiligo,[16] the neural hypothesis holds that neurochemical mediators released from the edges of the nerve endings exert toxic effects on melanocytes. The fact that both melanocytes and choroidal pigment cells originate from the mesenchyme and dermatomal spreading of segmental vitiligo are arguments propounded in favor of this hypothesis.[17]

The self-destruction hypothesis suggests that the intrinsic protective mechanisms that normally enable melanocytes to eliminate toxic intermediate products or metabolites on the melanogenesis path have been impaired in patients with vitiligo.[18,19] There is evidence of increased oxidative stress over the whole epidermis of patients with vitiligo.[20] Thus, free radicals affect melanin and cause membrane damage via lipid peroxidation reactions.[21]

The autoimmune hypothesis proposes a clinical relationship between vitiligo and several diseases believed to be autoimmune. Because the macrophage infiltration observed in vitiligo lesions is more pronounced on the perilesional skin, this hypothesis holds that macrophages may play a role in melanocyte removal.[21] The Koebner phenomenon observed in vitiligo lends support to the critical role of trauma in the etiopathogenesis of the disease.

Although we could not explain the co-presence of vitiligo and glaucoma, we believe that it may result from the fact that both diseases are observed in tissues that have the same embryologic origin and etiology, perhaps vascular or neural disorders, excessive accumulation of free radicals, or the triggering of apoptosis. Dermatologists should be alert to the presence of glaucoma in patients with vitiligo because glaucoma is an eye disease that progresses slowly and may lead to vision loss.

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