

# Retinal nerve fiber layer thickness in vitiligo patients

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**Background:** This study was designed to investigate the effect of vitiligo on the retinal nerve fiber layer (RNFL) thickness. **Materials and Methods:** This prospective study was conducted in the Department of Ophthalmology at Kırıkkale University during 2010 and 2011. Sixty eight eyes of 34 vitiligo patients were included in the study. Eighty four eyes were served as control. RNFL thickness was measured by scanning laser polarimetry (Nerve Fiber Analyzer, GDx VCC: 5.3.3; Laser Diagnostic Technologies, San Diego, CA, USA). **Results:** The mean duration of vitiligo was found to be  $9.8 \pm 2.3$  years. The mean average RNFL thickness outside the disc margin was significantly lower in the right eyes of vitiligo group in comparison to the controls ( $P = 0.02$ ). The mean average thickness of RNFL beneath the measuring ellipse in the superior sector of both eyes were significantly lower than the controls ( $P = 0.004$ ,  $P = 0.008$ , respectively). The topographical distributions of RNFL thickness in superior, inferior, nasal and temporal quadrants were similar for two groups. **Conclusion:** RNFL thickness seems to be unaffected in vitiligo patients.

**Key words:** Nerve fiber layer, retina, thickness, vitiligo

## INTRODUCTION

Vitiligo is an acquired, chronic pigmentation disorder characterized by white patches corresponding to a substantial loss of functioning epidermal and hair follicle melanocytes.<sup>[1]</sup> Few studies in the literature have reported ocular findings in vitiligo patients and possible associations between these two entities. Some degree of retinal pigment findings have been found as the major feature in the eyes of vitiligo patients.<sup>[2-6]</sup> Vitiligo patients with more extensive skin involvement and a longer disease duration were found to exhibit altered visual evoked potentials and an abnormal electro-oculographic findings.<sup>[7]</sup>

In a recent study, Rogosic *et al.* have proposed a possible association between vitiligo duration and glaucoma development.<sup>[8]</sup> Assessment of the retinal nerve fiber layer (RNFL) thickness by scanning laser polarimetry appears to be sensitive and specific for the evaluation of glaucomatous damage, especially early during the course of the disease.<sup>[9-11]</sup>

In the current literature, there is no report investigating the effect of vitiligo on RNFL. Therefore, In this study we measured the RNFL thickness in order to find out a structural effect of vitiligo on to the RNFL.

## MATERIALS AND METHODS

This prospective study was conducted in the Department of Ophthalmology at Kırıkkale University,

Kırıkkale, Turkey during 2010 and 2011. The Ethics Comitee of Kırıkkale University approved the study protocol (Research Project No. 562/10) and informed consents were obtained from all participants. The patient group included 68 eyes of 34 vitiligo patients. A total number of 42 subjects matched for age, and sex were recruited as controls.

For each patient, a thorough medical history including the medications was obtained and a general physical examination was performed by the same dermatologist to exclude any reason for secondary causes of vitiligo. Both vitiligo patients and control group underwent a complete ophthalmologic examination, including best corrected visual acuity and refraction, intraocular pressure measurment, ocular movements and biomicroscopy of the anterior and posterior segments of the eye.

Excluded were patients with previous neurological disease, previous ocular surgery, glaucoma, ocular hypertension, markedly diminished visual acuity and retinal disorders or systemic disorders affecting eye such as, diabetes mellitus and hypertension. Randomly assigned 42 eyes volunteers of similar age, and sex distribution were taken as the control group. The simple randomization was achieved by including a study coordinator who was not involved with the investigative part of the research. Same exclusion criteria were also valid for the control group.

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RNFL thickness was measured by scanning laser polarimetry (Nerve Fiber Analyzer, GDx VCC: 5.3.3; Laser Diagnostic Technologies, San Diego, CA, USA) for both groups. The measurement of RNFL thickness was carried out by the same examiner. The examinations were carried out in the same room for all subjects. The pupils were undilated.

The software device measures and then gives a series of parameters related to RNFL thickness. For each subject, more than one good-quality images were acquired to obtain the best image that would be used for the measurement of RNFL thickness. For all subjects mean RNFL thickness values were computed for all of the retina as well as superior (120 °), inferior (120 °), temporal (70 °) and nasal (50 °) segments and compared with the control group.

### Statistical analysis

The statistical analysis was performed using the Statistical Package for Social Sciences program. Analysis of variance was used to evaluate the statistical significance when comparing the two groups. *P* values less than 0.05 were considered as statistically significant.

## RESULTS

The study included 34 (15 male, 19 female) vitiligo patients and 42 (20 male, 22 female) controls. There was no difference in gender between the two groups. The mean age in the patient group was  $33.47 \pm 12.34$  (range 17-57) years compared to  $30 \pm 8.51$  (range 22-53) years in the control group. There was no statistically significant difference in mean age between the vitiligo group and control group (*P* = 0.31). The mean duration of vitiligo was found to be  $9.8 \pm 2.3$  years.

All vitiligo patients were receiving phototherapy with psoralen ultraviolet A. Vitiligo was generalized type in all patients. Five patients were found to have ocular findings, including peripapillary atrophy in three patients, focal hypopigmentation in one patient and diffuse hypopigmentation in one patient.

Table 1 shows the mean values for all parameters associated with RNFL thickness for both vitiligo and control groups.

The mean average RNFL thickness outside the disc margin was significantly lower than in the right eyes of vitiligo group in comparison to the controls (*F* (1-74) = 5.20, 95% confidence interval (CI) for mean 56.87-59.27, *P* = 0.02). The mean average thickness of RNFL beneath the measuring ellipse in the superior sector of both eyes were significantly lower than the controls (*F* (1-74) = 8.70, 95% CI for mean 67.97-70.99, *P* = 0.004, *F* (1-74) = 7.30, 95% CI for mean

**Table 1: Distribution of retinal nerve fiber layer thickness parameters in vitiligo patients and controls**

Parameters (OD/OS)	Vitiligo group (mean±SD)	Control group (mean±SD)	<i>P</i> value
TSNIT OD	56.58±4.93	59.27±5.38	0.02
TSNIT OS	58.05±5.06	59.32±5.19	0.28
Superior average OD	67.1±6.35	71.39±6.41	0.004
Superior average OS	69.47±0.7.77	73.96±6.79	0.008
Inferior average OD	66.15±9.55	67.09±7.53	0.62
Inferior average OS	69.79±8.79	70.64±8.92	0.67
Symmetry OD	0.99±0.16	1.01±0.12	0.36
Symmetry OS	0.99±0.12	0.98±0.14	0.84
Superior ratio OD	2.84±0.64	3.02±0.78	0.27
Superior ratio OS	3.41±0.92	3.51±0.94	0.63
Inferior ratio OD	2.95±0.87	2.96±0.70	0.93
Inferior ratio OS	3.42±0.86	3.61±1.07	0.40
Superior/nasal OD	2.58±0.64	2.47±0.49	0.37
Superior/nasal OS	2.87±0.63	2.71±0.42	0.18
Max modulation OD	2.29±0.71	2.23±0.70	0.70
Max modulation OS	2.59±0.88	2.88±0.95	0.17
Ellipse modulation OD	3.25±1.25	3.31±1.27	0.81
Ellipse modulation OS	4.50±2.02	4.87±1.93	0.41
Ellipse average OD	56.58±4.93	58.79±5.60	0.07
Ellipse average OS	58.05±5.06	59.74±4.47	0.12

TSNIT=Temporal-superior-nasal-inferior-temporal; OD=Oculus dexter (right eye); OS=Oculus Sinister (left eye); SD=Standart deviation; Max=Maximum

70.25-73.66, *P* = 0.008, respectively). The topographical distributions of RNFL in the superior, inferior, nasal, and temporal quadrants were similar between the vitiligo group and control group.

## DISCUSSION

Although the exact etiology of vitiligo is unknown, it has become quite clear in recent reports that genetic, immunological, neural and self-destructive mechanisms are involved in its pathogenesis. Whatever the primary injury is, antibodies directed against antigens of the melanocyte system were found to be destructive to the melanocytes in a vast majority of patients with vitiligo.<sup>[1]</sup> It is evident that multiple ocular abnormalities like uveal involvement, peripapillary atrophy, alterations of retinal pigment epithelium, focal and diffuse hypopigmentation may be found in patients with vitiligo.<sup>[2-6]</sup> Many of the ocular findings are non-specific and may be associated with immunological processes in the disease.

In a study by Rogosic *et al.*, it was proposed that there may be a possible association between vitiligo duration and glaucoma development.<sup>[8]</sup> As previously mentioned, scanning laser polarimetry is a reliable method for the diagnosis and follow-up of glaucoma and related retinal damage. Measurements are compared to a normative database to provide quick, easy, and objective analysis.<sup>[9-15]</sup> Therefore, we measured the RNFL thickness with scanning

laser polarimetry in vitiligo patients to detect a possible structural effect of the disease on to the neural retina.

In this study, the results revealed a little amount of significant evidence about the alterations of RNFL thickness in patients with vitiligo when compared with control group. The mean average RNFL thickness outside the disc margin was significantly lower in the right eyes of vitiligo group in comparison to the controls. The mean average thickness of RNFL beneath the measuring ellipse in the superior sector of both eyes was significantly lower than the controls. These differences need further investigations before considering them as early changes in RNFL thickness. The topographical distribution of RNFL in superior, inferior, nasal, and temporal quadrants were similar between vitiligo patients and control subjects.

To the best of our knowledge, this is the first study to focus on the possible alterations in RNFL thickness in vitiligo patients. We may conclude that the RNFL thickness seems to be unaffected in vitiligo patients. However, further data with larger series and longer disease durations might provide information to enlighten the association between vitiligo and glaucoma adequately. As our sample group is small, this study may provide only preliminary information that might pioneer clinical research in this field.

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