Evaluating nerve fiber layer changes in diabetic subjects using the GDxVCC

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Evaluating nerve fiber layer changes in diabetic subjects using the GDxVCC

Abstract
Purpose: Scanning laser polarimetry using the GDxVCC was conducted on diabetic and non-diabetic subjects to determine if RNFL (retinal nerve fiber layer) thickness differed between these two cohort groups. Design: Prospective, comparative case series, pilot study Subjects: Forty-four diabetic and forty-two non-diabetic subjects.

Methods: Subjects had a one-time office visit, consisting of visual acuities, pupil assessment, angle assessment, intraocular pressures, a GDxVCC scan, and a full fundus exam to determine if there were clinical findings of retinopathy present. Retinopathy was staged using the ETDRS (Early Treatment Diabetic Retinopathy Study) protocol.

Conclusion: The RNFL (retinal nerve fiber layer) in diabetic subjects was found to be statistically significantly thinner than the RNFL in non-diabetic subjects, but additional data collection is needed before conclusive results can be obtained.

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Thesis

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Evaluating Nerve Fiber Layer Changes in Diabetic Subjects Using the GDxVCC

By

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A thesis submitted to the faculty of the College of Optometry Pacific University Forest Grove, Oregon for the degree of Doctor of Optometry

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Advisor:
Salisa K. Williams, OD
Biographies

Mary Sezer
Mary Sezer is a student at Pacific University College of Optometry in Forest Grove, Oregon. She was a Radiation Technician in the United States Air Force for four years where she received the Accommodation Medal for her achievements. She then obtained an Associates of Arts and Science from Clark College in Vancouver Washington before transferring to Pacific University to finish her bachelor's degree. Her undergraduate work focused on invertebrate biology. She has been the faculty representative for her optometry class for the past four years. She has also been active with Amigos, VOSH, school screenings, and Special Olympics. She plans to practice in a co-management setting after completing a residency program.

Tawnya Wilson
Tawnya Wilson is a student at Pacific University College of Optometry in Forest Grove, Oregon. She has a bachelor's degree in Biology with emphasis in molecular and cellular biology from Pacific University undergraduate program. She is an active volunteer in the community. She plans to practice optometry in a rural setting, where she can pursue her career in family practice.

Lisa Lin Porter
Lisa Lin Porter is a student at Pacific University College of Optometry in Forest Grove, Oregon. She has a bachelor's degree in Biology from Portland State University in Portland, OR. She is an active member of the SOA as Faculty Representative for her class and Speaker Series Chairman for the entire school. She is currently a member of Beta Sigma Kappa Optometry Honors Association. In the future she plans to practice optometry in a co-management setting, where she can pursue her career in geriatrics and ocular disease.

Nichole Rioux
Nichole Rioux is an optometry student at Pacific University College of Optometry in Forest Grove, Oregon. Nichole has a bachelor's degree in biology and a minor in chemistry from Montana State University-Billings. Nichole is actively involved in Amigos, and SOA. She plans to own a private practice in Montana and pursue an active role in the management of diabetes.
Abstract

Purpose: Scanning laser polarimetry using the GDxVCC was conducted on diabetic and non-diabetic subjects to determine if RNFL (retinal nerve fiber layer) thickness differed between these two cohort groups.

Design: Prospective, comparative case series, pilot study


Methods: Subjects had a one-time office visit, consisting of visual acuities, pupil assessment, angle assessment, intraocular pressures, a GDxVCC scan, and a full fundus exam to determine if there were clinical findings of retinopathy present. Retinopathy was staged using the ETDRS (Early Treatment Diabetic Retinopathy Study) protocol.

Conclusion: The RNFL (retinal nerve fiber layer) in diabetic subjects was found to be statistically significantly thinner than the RNFL in non-diabetic subjects, but additional data collection is needed before conclusive results can be obtained.

Key words: GDxVCC, diabetes, diabetic retinopathy, RNFL (retinal nerve fiber layer)
Introduction
Currently, there is limited research regarding the detection of nerve fiber layer changes in subjects with diabetes prior to clinical findings of retinopathy using the nerve fiber layer analyzer, GDxVCC. A small prospective study of 40 diabetic subjects using scanning laser polarimetry in diabetic subjects by Lonneville et al found that poor metabolic control of diabetes mellitus adversely affects the thickness of the retinal nerve fiber layer, which needs to be kept in mind when assessing glaucomatous progress in diabetic patients.
Methods

One hundred subjects (Table 1) volunteered to participate in this research study. Each subject had a one-time office visit, consisting of visual acuities, pupil assessment, angle assessment, intraocular pressures, a GDxVCC scan, and a full fundus exam to determine if there were clinical findings of retinopathy present. Retinopathy was staged using the ETDRS (Early Treatment Diabetic Retinopathy Study) protocol. All subjects provided signed informed consents prior to testing. Subjects with any significant abnormality other than diabetic retinopathy were excluded from the study. The following subjects were eliminated from this research project: seven subjects were found to be glaucoma suspects, two were determined to have macular degeneration, two had Amsler grid distortions, one had a retinal coloboma, one had drusen in the macular region, and one subject had a unilateral cataract. A total of eighty-six participants were utilized for this study. All subjects self-reported ethnicity, current age, and diabetic status. If a subject reported diabetic history, then duration, medication, and control status was indicated on the medical history interview. Forty-four subjects had been previously diagnosed with either Type I or Type II diabetes. Forty-two had verbalized no prior diabetic history. Volunteer subjects were obtained through promotional material displayed at Pacific University College of Optometry and community service organizations, diabetic screenings held at the Native American Rehabilitation Association and Virginia Garcia Medical Clinics, and through individual communication by examiners.
Results

The RNFL (retinal nerve fiber layer) in diabetic subjects was found to be statistically significantly thinner than the RNFL in non-diabetic subjects.
Discussion

While the RNFL in diabetic subjects was found to be statistically significantly thinner than the RNFL in non-diabetic subjects, the researchers acknowledge that this difference may be reflecting a RNFL difference merely between Native Americans and non-Native Americans due to the imbalance of subjects. Most of the diabetic subjects in this study were Native Americans, while most of the non-diabetics subjects were white. More data collection from non-diabetic Native Americans and diabetic white subjects is needed before conclusive results can be obtained.
Conclusion

The RNFL (retinal nerve fiber layer) in diabetic subjects was found to be statistically significantly thinner than the RNFL in non-diabetic subjects, but additional data collection is needed before conclusive results can be obtained.
Table 1: Subjects listed by race

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Race</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic</td>
<td>27 Native Americans</td>
</tr>
<tr>
<td></td>
<td>12 Hispanics</td>
</tr>
<tr>
<td></td>
<td>4 Caucasians</td>
</tr>
<tr>
<td></td>
<td>1 Asian</td>
</tr>
<tr>
<td>Non-diabetic</td>
<td>24 Caucasians</td>
</tr>
<tr>
<td></td>
<td>14 Hispanic</td>
</tr>
<tr>
<td></td>
<td>3 Asians</td>
</tr>
<tr>
<td></td>
<td>1 Native Americans</td>
</tr>
</tbody>
</table>
References