

A STUDY OF KERATOMETRIC FINDINGS
BASED ON RACE

By Susan Giroux
Senior Optometry Student
Ferris State University
College of Optometry

ABSTRACT

Keratometric findings are often used to determine an initial trial lens base curve selection. A difference in average findings between races and ethnic groups may aid in predicting more accurately the proper base curve selection. Other known differences in ocular anatomy and physiology between races have been previously documented. This paper compares keratometric findings on a sample population of black, white, and native American people to determine if there is a significant difference in average corneal curvature. The results show that the white population have the steepest corneal curvature, followed by native Americans and then blacks.

INTRODUCTION

Many ocular anatomical and physiological differences between races and ethnic groups are well known and documented. Inhabitants of different geographical areas develop differences that may provide more efficient protective function. An example is the pigmentation at the macula in blacks which reduces the risk of macular disease with age. Age related macular degeneration occurs 2-6 times more frequently in whites than blacks.¹ Evidence exists that region and environment affect the accommodative system as well. There is a difference in the age of onset of presbyopia between racial groups, as reported by Ong.² In a study of Southeastern Asian refugees, it was reported that the average onset of presbyopia was 35 years and a full correction for near was necessary by the age of 42.

An example of a structural variation between races is the difference in the size of tear ducts. The tear ducts in blacks are wider and shorter in length, resulting in a significantly lower incidence of dacryocystitis.³ Race is also a risk factor for glaucoma, one of the leading causes of blindness in the United States. Open-angle glaucoma is more common in the black population than in any other racial or ethnic group. A biological difference exists which renders the optic nerve more susceptible to pressure-induced optic atrophy.⁴ Blacks are also less prone to pigmentary dispersion glaucoma. An explanation being that their irides are less likely to come into contact with the zonules.⁵

Racial differences in corneal curvature have not previously been explored. In this study, keratometry readings on a sample population of black, white, and native Americans will be compared to determine if there is a significant difference in average corneal curvature. Possible clinical application will be explored.

METHODS

Records were randomly selected at the Optometric Institute and Clinic of Detroit to obtain keratometry findings on 60 black patients. The age for males ranged from 19 to 58 years and females 17 to 55 years. The average age of the black males was 31 years and females 33 years. Only primary care and contact lens patient records were utilized for this study. Any patients with significant pathology or corneal cylinder in excess of 3.00 diopters were excluded. Files on 30 male and 30 female patients at a commercial practice in Novi, Michigan were used to obtain corneal curvature

POPULATION INFORMATION			
sample		age range	avg.
BLACK	30 males	19 to 58	31
	30 females	17 to 55	33
WHITE	30 males	16 to 46	31
	30 females	19 to 53	28
NATIVE	4 males	18 to 26	21
AMERICAN	7 females	32 to 51	40

Table 1

measurements on white patients. The age ranged from 16 to 46 years for males and females 19 to 53 years. The average age for white males was 31 years and for females was 28 years. Patient records from a private practice in White Earth, Minnesota and Red Lake, Minnesota were used for the sample of native Americans. Four of the patients were male with an age range from 18 to 26 years and an average of 21 years. Seven of the patients were female with an age range of 32 to 51 years and an average of 40 years. Keratometry findings were averaged for each race and compared.

RESULTS

There was a significant difference in keratometry findings between the black and white patient samples, with a lesser degree of difference between the white vs. the native American and black vs. native American comparisons.

Racial differences in corneal curvatures have not previously been explored. In this study, keratometry readings on a sample population of black, white, and native American will be compared to determine if there is a significant difference in average corneal curvatures. Possible clinical application will be explored.

METHODS

Records were randomly selected at the Ophthalmic Institute and Clinic of Detroit to obtain keratometry findings on 60 black patients. The age for

POPULATION INFORMATION			
Sample	Age Range (yrs)	Number	Sex
BLACK	15 to 25	30	males
	17 to 25	30	females
WHITE	16 to 44	30	males
	18 to 21	30	females
NATIVE AMERICAN	18 to 25	4	males
	21 to 21	7	females

males ranged from 15 to 25 years and females 17 to 25 years. The average age of the black males was 21 years and females 23 years. Only primary care and contact lens patient records were utilized for this study. Any patients with significant pathology or corneal cylinder in excess of 3.00 diopters were excluded. Files on 30 male and 30 female patients at a contact lens practice in Novi, Michigan were used to obtain corneal curvatures on white patients. The age range for males and females was 15 to 25 years. The average age for white males was 21 years and for females was 23 years. Patient records from a private practice in White Earth, Minnesota and Red Lake, Minnesota were used for the sample of native American. Part of the patients were male with an average age of 21 years. The remainder were female with an average age of 23 years and an average of 17 years for the female patients. Data were averaged for each race and compared.

RESULTS

There was a significant difference in corneal curvatures between the black and white patients studied, with a higher degree of curvature between the white and the native American and black patients. The average keratometry

Corneal curvature for blacks was 0.76 diopters flatter than whites. Native Americans had an average of 0.36 diopters flatter than the white patient sample (Table 2).

A random selection of records were used at each of the three locations to obtain keratometry readings. No attempt was made to use refractive error as a selection criterion. Completely random selection was limited by the fact that, in addition to race, patients differed in overall economic status. The Optometric Institute and Clinic of Detroit serves primarily inner city residents. Those patients seen at the commercial and private practices represent a suburban population. Keratometric findings from the white population were primarily contact lens wearers. The black and native American samples had fewer contact lens patients. It is possible to infer that the white patient sample includes a higher percentage of myopic patients. This may have influenced the calculated average corneal curvatures.

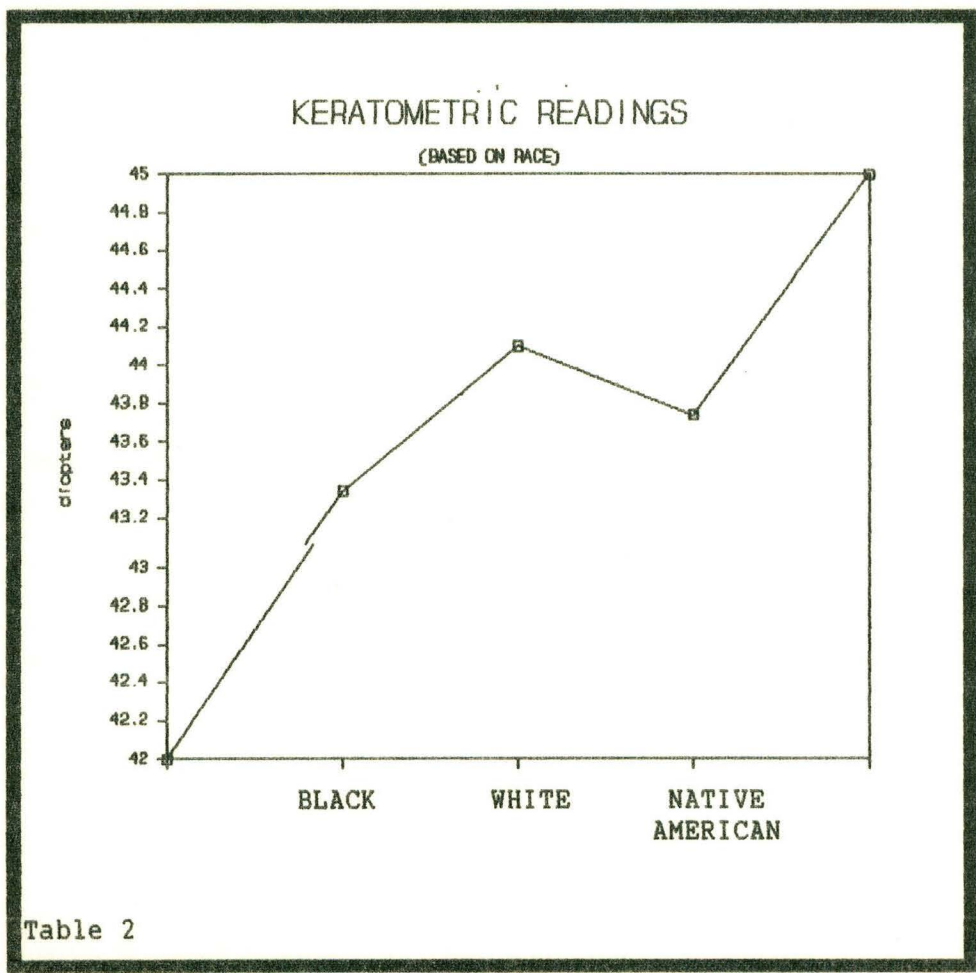


Table 2

DISCUSSION

This study indicates that an optimal contact lens inventory may differ depending on the patient population. Average central corneal curvature appears to vary with race. Curvature variations outside the central 3mm zone may have more impact on contact lens-cornea relationship than can be provided by keratometric readings. Opaque contact lenses require centration for the best cosmesis, therefore, further insight into peripheral corneal topography will enhance practitioner success and patient satisfaction.

Completed 3/90

Corresponding author:

Susan Giroux

38657 Rhonswood Court

Northville, MI 48167

REFERENCES

1. Lovie-Kitchin, J. and Bowman, K.J., Senile Macular Degeneration, Butterworth Publishers, Boston, 1985.
2. Ong, J., "Southeastern Asian Refugees' Presbyopia", Perceptual and Motor Skills, Vol. 53, 1981, pp. 667-670.
3. Martin, M.J., Sommer, A., Gold, E.B. and Diamond, E.L., "Race and Primary Open Angle Glaucoma", American Journal of Ophthalmology, Vol. 99, No. 4, April 1985, pp. 383-387.
4. Martin, pp. 383-387.
5. Motoloko, M. A. and Phelps, C.D., "The Secondary Glaucomas", Duanes Clinical Ophthalmology, Vol 3, No. 54, pp. 3-5, 1987.