A Comparison of the Black Population at OIC to Available Norms in General Polulation: C/D Ratio, Applanation Tonometry

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Introduction

The physiological cupping of the optic nerve head varies considerably from person to person. The knowledge of such a variation helps the clinician in the diagnosis of primary open angle glaucoma(POAG). As the variation in optic nerve cupping helps the clinician, it is only one of many aspects used in the diagnosis of POAG. This knowledge is especially helpful in diagnoses involving populations at high risk of developing POAG, in this case the black population.<1,2,3,4,5>

Many different aspects of variations in optic nerve head evaluation have been performed. Many of these reports have stated that the cup/disc (C/D) ratio is larger, on average, in the black population compared to the norms for the average white patient<6>. Blacks experienced more disc and field damage progression than whites at similar IOP's. This suggests that blacks must maintain lower IOP's to prevent progressive glaucomatous damage<1>. Blacks develop disc damage in previously normal disks and progression of disc damage in eyes of blacks and whites occured at a faster rate in the eyes of blacks<1> Visual field loss was more frequent in blacks, but not statistically significantly<7> . If theses norms are correct, the clinician must base his decision to begin glaucoma treatment on a black glaucoma suspect taking these variations into consideration. If the C/D ratio is .5 in two patients, one black and one white, then the white patient would be at a higher level of concern because the average C/D for the white population is less than the black population. It has been documented that the average C/D of whites is .3 or less in 67% <8> of the population, and this average increases to 80% in other reports <9>.

POAG may have a greater prevalence, present earlier, progress more rapidly, respond to meds differently, and be associated with a higher percentage of blindness in blacks <10>. The purpose of this study was to compare previously published norms and determine if blacks have larger physiological C/D ratios than whites. establish norms on the average C/D ratio in a specific black population. Clinical observations suggest more normal size C/D ratios in blacks than the data claims.

Clinical Population and Methods

The study population was chosen at random from black patients seeking eye care services from the Optometric Institute and Clinic of Detroit (OIC). OIC is a not - for - profit health service agency, servicing the vision care needs of the center city population, in affiliation with the Ferris State University, College of Optometry, Big Rapids, Michigan.

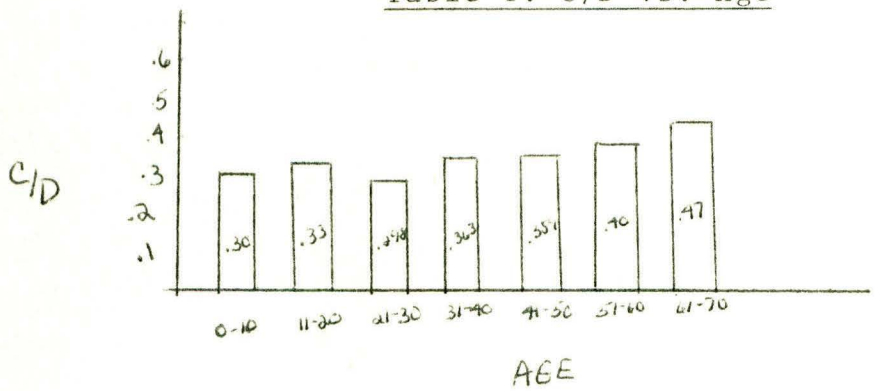
Requirements for inclusion in the study: black origin (from case history), no previous diagnosis or treatment of glaucoma, and no significant vision loss from any other disease condition. Patients with an intra - ocular pressure of over 21 mmHg were removed from the study, since this high pressure may be enlarging the physiological cupping of the optic nerve head . All patients were examined between the dates of 6/88 - 9/88 and 1/89 - 3/89.

For all patients the following data was collected: sex, age, goldman applanation tonometry, visual acuity (best corrected) and cup/disc ratio as measured with a Propper Autofoc ophthalmoscope with a measuring pattern aperture. This measuring pattern aperture had a graduated horizontal axis, to discourage variation in measuring C/D ratios from patient to patient. All measurements were taken by the same clinician. The C/D ratio was measured in both the horizontal and vertical meridian. The average of these two measurements was taken as the overall C/D ratio.

Results

A total of 107 eyes were studied. In most patients both eyes were used, but monocular patients were also included. Of the patients included, 30 (56%) were male, and 24 (44%) were female. The ages of subjects ranged from 6 years to 88 years. Due to lack of patients age 70 and over, these age groups could not be contained in the study. The subjects were assigned to groups based on age. Each age group was 10 years in size, with The first being 0 - 10, 11 - 20, and so on. For each age group the average C/D ratio was calculated. The results are graphed in Table 1.

Table 1: C/D vs. Age



The variation was slight from the ages of 0 - 50, with most subjects falling into the .3 - .35 range. Subjects age 50+ tend to have larger C/D ratios, averaging to .4 and greater. This variation should be compared to the average IOP to determine if

the increase cupping is related to an increase in IOP as the age increases. These results are graphed in Table 2.

Table 2: IOP vs. Age

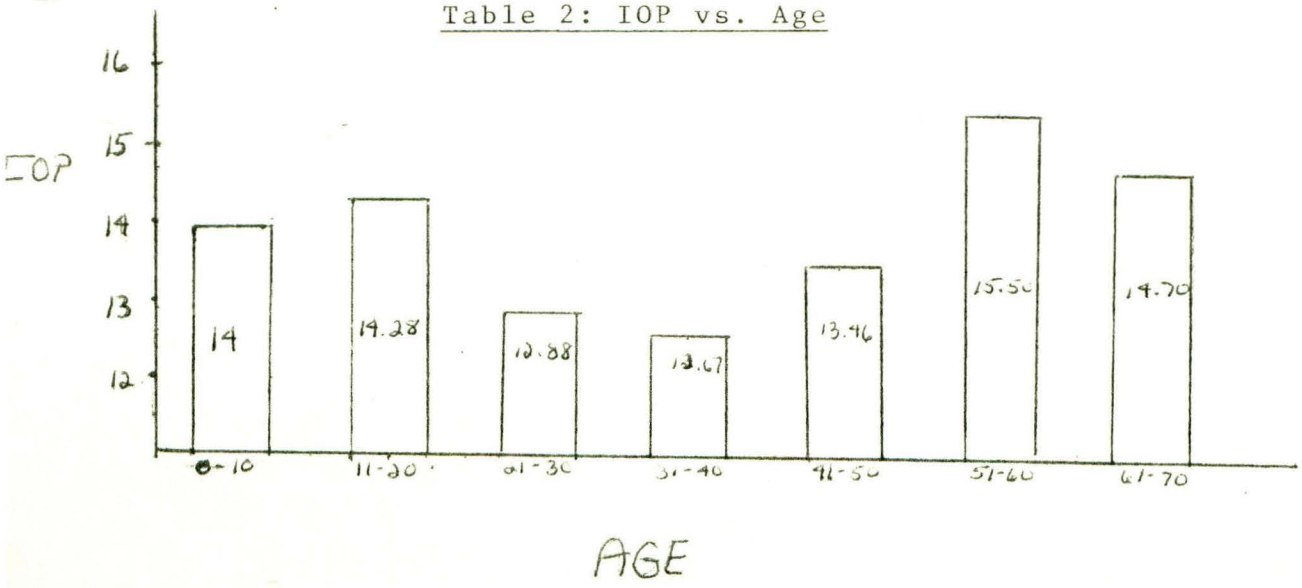


Table 2 does not illustrate any large deviation in IOP's as the subjects are aging.

Table 3 shows the relationship between average C/D ratio and average IOP. This demonstrates that those subjects with a C/D ratio of .5 or greater are most likely to exhibit an elevated IOP, although even the highest group (C/D ratio > .6) was not near the IOP required to be considered a "glaucoma suspect" (IOP > 21 mmHg). Although the IOP's are not into the range considered dangerous, the increase in IOP is still important to note, considering the previous evidence that blacks are more suseptible to glaucomatous changes at lower IOP's than whites

Table 3: IOP vs. C/D

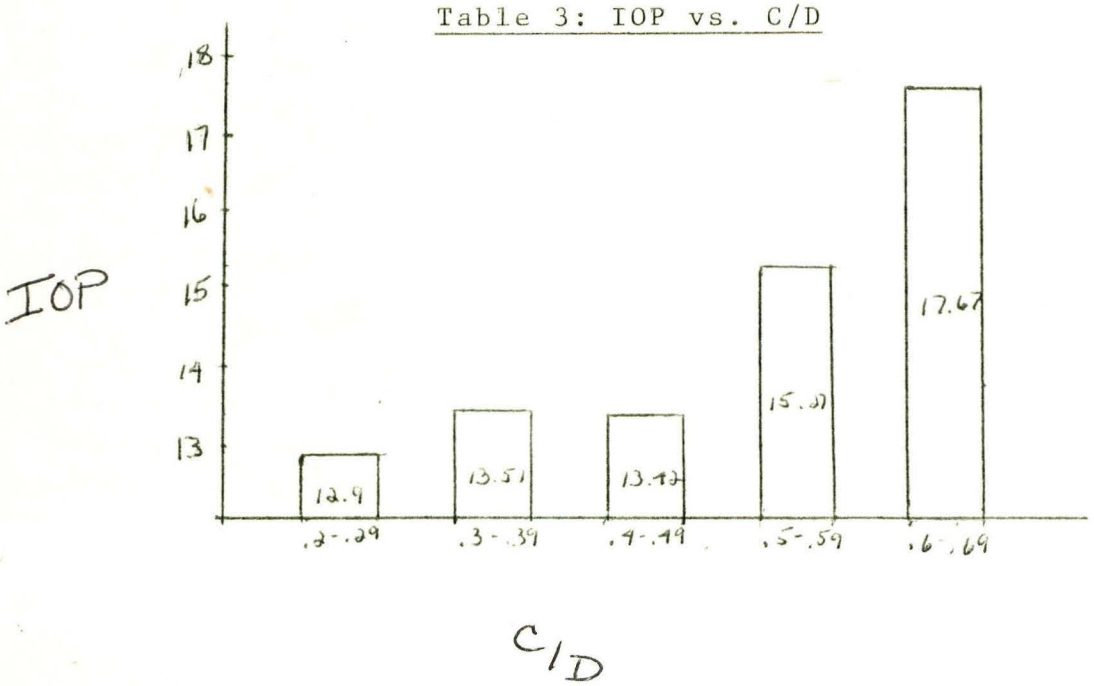


Table 4 shows the number of eyes studied and which C/D ratio range each subject fell into.

Table 4: # of Eyes per C/D Group

C/D	# of eyes
.2-.29	21
.3-.39	36
.4-.49	35
.5-.59	11
.6-.69	3

Discussion

The data indicate that overall, the physiological cupping is indeed greater in the black population than the white. However, when looking at the younger group, the averages more closely approach the normals given for whites. Overall, 20 % have C/D ratios of near .3, 54 % at or less than .5. It is reported that 25 % of blacks have a C/D of .5 or larger <5>. This holds true for the group over the age of 30 in the present study, but not for those under the age of 30. There was only one eye with a C/D greater than .5 in the 0 - 10 group, none in the 11 - 20 group, and none in the 21 - 30 group. 25 % of those between the ages of 31 - 40 had C/D ratios of over .5, 8 % between the ages of 41 - 50, 42 % for those between 51 - 60, and 50 % of those over the age of 60 had C/D ratios at or greater than .5.

For those patients under the age of 30, few patients had C/D ratios at or greater than .5. Yet 27 % of those over 30 have C/D ratios at or above .5, with increasing frequency with age.

There are several limitations involved with this study. The size of the data base was small (107 eyes). There were fewest subjects falling into the 21 - 30 age group, with the rest being relatively equal with about 18 - 25 eyes per group. All subjects were already seeking eye care at the clinic, which prevents the study from being a truely "random" sample. This effect is minimized since the reason for presentation at the eye clinic was not due to symptoms of primary open angle glaucoma, which is associated with few symptoms.

The results of this study reiterate the need for the clinician to use all available tools in the diagnosis of primary open angle glaucoma in high risk groups such as blacks. The diagnosis should reflect that blacks tend to have larger physiological optic nerve cupping, not related to pathological intra ocular pressures. In those situations where the diagnosis of POAG is postulative, the clinician should be aware that larger C/D ratios in blacks is normal. The goal here is to prevent unnecessary anti-glaucoma therapy to patients whose C/D is observed as pathological. This situation appears to change somewhat when the 50+ age group is compared to the rest of the population. This study may alert the clinician that the 50+ age group may be more sensitive to lower IOP's than the rest of the population. The tendency in the 50+ age group is to show increased cupping at pressures that would not earn a diagnosis of POAG on their own merits. In both cases, the importance of visual field testing in the determination of a POAG diagnosis is critical to determine large physiological cups from glaucomatous cups.

As with any population, the older black population demonstrates an increased suseptibility to primary open angle glaucoma. With the available data demonstrating an increased risk of glaucoma in the black population, this increased risk for the 50+ age group needs to be addressed. With the lack of proper health resources available to the inner city population, and the factor that POAG will be asymptomatic in early stages in the majority of cases, the need for routine eye services for blacks increases greatly.

References

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