

THE PREVALANCE OF HYPEROPIA AMONG PEOPLE WITH 20/20 UNCORRECTED VISUAL ACUITY

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Abstract : Purpose: To investigate the proportion of hyperopia among people with 20/20 uncorrected visual acuity

Methods: We prospectively evaluated the percentage of hyperopia in 113 consecutive eyes of 70 patients with 20/20 uncorrected visual acuity and no ocular diseases. The mean (\pm standard deviation) age of the group was 55 ± 11 (ranging 15 to 88) years old. The spherical equivalent of the subject refraction was used for the analysis.

Results: The percentage of hyperopia ($\geq +0.25D$) in the population was 53%.

Conclusions: To our knowledge, this is the first report that investigated the percentage of hyperopia in a group of people with 20/20 uncorrected visual acuity. We should recognize that eyes with 20/20 uncorrected visual acuity comprise a substantial proportion of hyperopia.

Key words : hyperopia, subject refraction, uncorrected visual acuity, eye fatigue, vision screening

It is well known that emmetropic eyes can enjoy the widest range of vision, from infinity to the near point, depending on the ability of accommodation. Hyperopic eyes have to accommodate more to clearly see any targets¹⁾. It has been well recognized that hyperopic eyes often cause eye fatigue²⁾. People with hyperopia often experience a decrease of the quality of life when they enter the presbyopic age group¹⁾.

Many reports have been published regarding the prevalence of myopia, emmetropia, and hyperopia in certain areas, ages, and ethnic groups. Research on the prevalence of hyperopia published in the Past five years is summarized in Table 1.

However, we have never seen reports studying the prevalence of hyperopia in people with 20/20 uncorrected visual acuity.

The percentage of postoperative 20/20 uncorrected visual acuity is often referred to as the success rate of keratorefractive surgery. However, the population may contain a substantial percentage of hyperopia, which may cause marked decrease of vision several years or decades later.

In the present study, we examined the prevalence of hyperopia in a group of patients with 20/20 uncorrected visual acuity.

METHODS

We prospectively examined 113 consecutive eyes of 70 volunteers including doctors, who presented at the Department of Ophthalmology, Hiraoka Hospital, Osaka, Japan, in March, 2002. The eligibility criteria of this study were being 15 or more years old, having no ocular diseases except refractive errors, and having equal to or better than 20/20 uncorrected visual acuity.

One ophthalmologist (Dr. Kaichiro Wada) performed complete eye examination including object refraction using an autorefractometer (KR8100, TOPCON, Tokyo, Japan), slit-lamp examination, and funduscopy. Subject refraction was meticulously examined after 10 minutes of binocular fogging with lenses three diopters (D) more plus than the value obtained with the autorefractometer. The spherical equivalent of the subject refraction was recorded and used for the analysis.

RESULTS

In the group examined, the ages of patients were 55 ± 11 (mean \pm standard deviation), ranging from 15 to 88 years old. There were 33 men and 37 women.

The spherical equivalent of the subject refraction was 0.32 ± 0.51 (mean \pm standard deviation), ranging from -0.88 to 2.13 D. The percentage of hyperopia ≥ 0.25 D was 53% (60 eyes), ≥ 0.50 D was 44% (50 eyes), ≥ 1.00 D was 18% (20 eyes), myopia ≤ -0.25 D was 25% (28 eyes), and emmetropia (others) was 22% (25 eyes).

The spherical equivalent of object refraction measured with the autorefractometer was 0.06 ± 0.55 , ranging from -0.88 to 1.5 D. The percentage of hyperopia ≥ 0.25 D was 45% (51 eyes), ≥ 0.50 D was 33% (37 eyes), ≥ 1.00 D was 10% (11 eyes), myopia ≤ -0.25 D was 35% (39 eyes), and emmetropia (others) was 20% (23 eyes).

DISCUSSION

It was very striking that the percentage of hyperopia in the group of people with 20/20 uncorrected visual acuity was more than 50%. The group of people with 20/20 uncorrected visual acuity included those with emmetropia, mild myopia, and mild hyperopia. In the present study we predetermined the minimum age as 15 years old. If children under 15 years old, with more ability of accommodation, were included in this study, the proportion of hyperopia might have been greater.

To measure only uncorrected visual acuity as a screening of vision may be insufficient to detect hyperopic eyes. A significant percentage of hyperopic patients are estimated to leak from the screening, resulting in missed opportunities to know the refractive error of the eye, to correct the error, and to relieve their eye fatigue.

Most of the reports of the refractive surgery describe the incidence of postoperative uncorrected visual acuity of 20/20¹³⁾. Many people may think that the higher the percentage becomes, the better the outcome of the surgery. It is well known that in order to increase the percentage of uncorrected visual acuity of 20/20, some ophthalmologists shift the nomogram to the direction of postoperative hyperopia.

However, following our conscience, this is not a respectable strategy. Hyperopia very

Table 1. The prevalence of hyperopia in recent reports (y.o.: years old)

Race	Number	Age	Criteria	Cycloplegic or not	Incidence	Reference
1 USA,Europe,etc.	29281	≥ 40	$\geq +3D$	no	5.8-11.6%	³⁾
2 China	5053	5-15	$\geq +2D$	cycloplegic	17%at5y.o. 1% \geq at15y.o.	⁴⁾
3 Bangladesh	11624	≥ 30	$\geq +0.5D$	no	20.6%	⁵⁾
4 Singapore	946	15-19	$\geq +0.5D$	no	1.5%	⁶⁾
5 Taiwan	2045	≥ 65	$> +0.5D$	no	59%	⁷⁾
6 Mixed	2523	5-17	$\geq +1.25D$	cycloplegic	12.8%	⁸⁾
7 Indonesia	1043	≥ 21	$\geq +1D$	no	18.5%	⁹⁾
8 India	6447	5-15	$\geq +2D$	cycloplegic	7.7%	¹⁰⁾
9 Singapore	1232	40-79	$> +0.5D$	no	28.4%	¹¹⁾
10 Black	4709	40-84	$> +0.5D$	no	46.9%	¹²⁾

badly afflicts people when they enter the presbyopic age group. We must properly recognize that the group with uncorrected visual acuity of 20/20 contains a substantial proportion of hyperopic people.

In conclusion, we measured the percentage of hyperopia in a group of the people composed of mixed age groups with uncorrected visual acuity of 20/20. More than half of the people had hyperopia. We should bear this fact in mind in evaluating the data of the vision screening, refractive surgery, and others.

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