

Comparison of Keratometer Measurements to
Simulated K's as Measured by EyeSys Corneal
Analysis System, using Version 3.1 Software.

Authors: Frances Meram
and
Martha Bielecki

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INTRODUCTION:

The uses of computerized video keratography (CVK) is expanding, for example in contact lens fitting, refractive surgery, keratoconus, etc. The standard way of measuring corneal curvature is by manual keratometer measurements. The keratometer derives its readings from a direct linear measurement taken between two pairs of points on a mire approximately 3.2 mm apart. The mires are reflected from the anterior surface of the cornea. In contrast, CVK uses a computer to analyze a series of eight concentric rings reflected off the cornea, giving 5,760 points over a nine mm diameter. This study is a comparison of the similarity between the EyeSys programs K readings to Manual K readings.

METHODS:

Steepest and flattest corneal curvature methods were compared using a standard Marco Keratometer and the EyeSys Corneal Analysis System Unit, using Version 3.1 Software. A Nidek ARK 2000 Autorefractor was also used. Forty eyes were used in the study. The criteria for subject selection included a best corrected spectacle acuity of 20/20, a normal external and slit lamp examination, including no corneal irregularities and smooth K mires.

The data was gathered by two examiners to maintain a blind study. One examiner obtained corneal curvature measurements with the keratometer and another examiner obtained measurements from the EyeSys system. Refractive data was also collected for each eye.

RESULTS:

Table 1 shows the raw data for the diopters of toricity as measured with the standard keratometer and the EyeSys. Table 4 shows the difference between the delta K's of the two systems. Tables 2 and 3 show the refractive data collected for each eye.

SUMMARY:

Forty percent of the delta K's between the EyeSys and the keratometer varied within 0.10 Diopters from the mean value of the delta K from Table 4. Thirty two and a half percent of the delta K's between the two instruments varied within 0.11 to 0.20 Diopters from the mean value of the delta K from Table 4. Twenty percent varied within 0.21 to 0.30 Diopters, two and a half percent varied within 0.31 to 0.40 Diopters, and five percent varied within 0.41 to 1.00 Diopters from the mean value of the delta K in Table 4. Therefore, approximately 75% of the measurements taken varied up to 0.20 Diopters from the mean value of the delta K in Table 4. It can be stated that when measuring K readings from the EyeSys, and examiner can assume the measurements will be within 0.20 Diopters to the manual keratometry readings.

REFERENCES:

1. Lester, Stephen F. et al; Clinical Application of Corneal Topography. ICLC 1994; 21:170.

Table 1: Diopters of Toricity as Measured with the Standard Keratometer and the Eyesys

Subject	Keratometer		Eyesys	
	Flat	Steep	Flat	Steep
1	43.25	44.25	43.43	44.52
2	43.00	44.12	43.10	43.94
3	39.37	40.75	39.61	40.08
4	40.05	40.75	39.94	40.51
5	42.75	42.87	41.87	42.61
6	43.12	42.50	42.29	42.72
7	43.37	43.75	42.99	43.10
8	43.25	43.62	43.15	43.43
9	41.87	42.37	41.82	42.29
10	42.50	43.12	41.82	42.24
11	45.50	45.62	44.64	44.82
12	45.25	45.75	45.06	45.48
13	44.25	44.50	44.11	44.23
14	44.87	45.25	44.64	44.82
15	43.12	43.75	43.32	43.94
16	42.87	43.75	42.77	43.21
17	43.50	43.75	42.61	42.99
18	43.50	44.25	43.21	43.54
19	44.50	44.62	44.34	44.94
20	44.12	45.00	44.23	44.76
21	44.75	45.25	43.66	44.06
22	44.75	45.37	44.34	44.94
23	42.75	43.62	43.10	43.66
24	42.37	43.75	41.79	42.70
25	41.62	42.00	41.46	41.82
26	41.37	42.25	40.90	41.46
27	43.25	44.50	42.82	43.77
28	44.50	44.75	44.25	44.70
29	43.25	43.50	42.55	42.77
30	44.00	44.00	43.10	43.26
31	45.25	45.25	44.58	45.00
32	45.50	45.62	44.11	44.88
33	43.25	43.75	41.61	42.34
34	44.00	44.25	42.99	43.54
35	44.75	45.25	44.06	44.58
36	45.00	45.25	44.29	44.58
37	46.50	47.37	45.98	46.74
38	46.50	47.25	45.66	46.42
39	46.00	46.25	45.42	45.73
40	46.25	46.50	45.36	45.85
Mean	43.7405	44.25175	43.2745	43.77425
Median	43.5	44.25	43.18	43.855
AveDeviation	1.258525	1.140925	1.163225	1.17225
Max Value	46.5	47.37	45.98	46.74
Min Value	39.37	40.75	39.61	40.08

Table 2 Refractive & Astigmatic data for the study populatio

	Refractive	Refractive	Mean
	Sphere	Spectical	Corneal
Subject	Power	Cylinder	Cylinder
1	-1.00	0.87	1.12
2	-0.75	1.37	1.37
3	-0.37	0.37	0.87
4	-1.37	0.25	0.37
5	-0.87	0.75	0.87
6	-0.87	0.50	0.75
7	-0.50	0.37	0.12
8	-0.50	0.50	0.37
9	-3.00	0.87	0.37
10	-3.25	0.62	0.37
11	-1.00	0.25	0.00
12	-0.62	0.62	0.62
13	-0.12	0.62	0.25
14	0.00	0.50	0.50
15	0.50	0.75	0.50
16	0.37	0.37	0.75
17	-2.50	0.12	0.50
18	-2.75	0.12	0.50
19	0.00	0.37	0.50
20	0.00	0.25	0.87
21	-0.12	0.37	0.37
22	-0.12	0.25	0.37
23	0.12	0.50	0.62
24	0.00	0.25	1.25
25	-0.75	0.50	0.37
26	-0.37	0.62	0.50
27	-0.50	1.00	0.87
28	-0.87	0.50	1.00
29	0.25	0.12	0.37
30	0.50	0.37	0.25
31	-3.87	0.37	0.37
32	-3.87	0.25	0.37
33	0.50	0.50	1.00
34	0.62	0.62	0.62
35	0.50	0.62	0.62
36	0.25	0.12	0.37
37	-6.62	0.62	1.00
38	-7.75	1.00	1.12
39	-6.12	0.37	0.25
40	-6.25	0.50	0.50
Mean	-1.33	0.50	0.59
Minimum	-7.75	0.12	0
Maximum	0.62	1.37	1.37

Table 3:
Mean Refractive and Astigmatic data for the
Study Population

Subject	Mean	Range	
n=20(40eyes)			
Mean Refractive Shpere Power	-1.33	0.62 to-7.75	
Mean spectacle cylinder	0.50	0.12 to1.37	
Mean Corneal Cylinder	0.59	0.00 to1.37	

Table 4: A Comparison of the Delta K
Between the Two Instruments

Subject	<i>AK of</i>	<i>AK of</i>	Delta K
	Keratomete	Eyesys	
1	1.00	1.09	0.09
2	1.12	0.84	0.28
3	1.38	0.47	0.91
4	0.70	0.57	0.13
5	0.12	0.74	0.62
6	0.62	0.43	0.19
7	0.38	0.11	0.27
8	0.37	0.28	0.09
9	0.50	0.47	0.03
10	0.62	0.42	0.20
11	0.12	0.18	0.06
12	0.50	0.42	0.08
13	0.25	0.12	0.13
14	0.38	0.18	0.20
15	0.63	0.62	0.01
16	0.88	0.44	0.44
17	0.25	0.38	0.13
18	0.75	0.33	0.42
19	0.12	0.60	0.48
20	0.88	0.53	0.35
21	0.50	0.40	0.10
22	0.62	0.60	0.02
23	0.87	0.56	0.31
24	1.38	0.91	0.47
25	0.38	0.36	0.02
26	0.88	0.56	0.32
27	1.25	0.95	0.30
28	0.25	0.45	0.20
29	0.25	0.22	0.03
30	0.00	0.16	0.16
31	0.00	0.42	0.42
32	0.12	0.77	0.65
33	0.50	0.73	0.23
34	0.25	0.55	0.30
35	0.50	0.52	0.02
36	0.25	0.29	0.04
37	0.87	0.76	0.11
38	0.75	0.76	0.01
39	0.25	0.31	0.06
40	0.25	0.49	0.24
Mean	0.54225	0.49975	0.228
Median	0.5	0.47	0.195
AveDeviati	0.299088	0.18322	0.1567
Max Value	1.38	1.09	0.91
Min Value	0	0.11	0.01

Diopters of Toricity

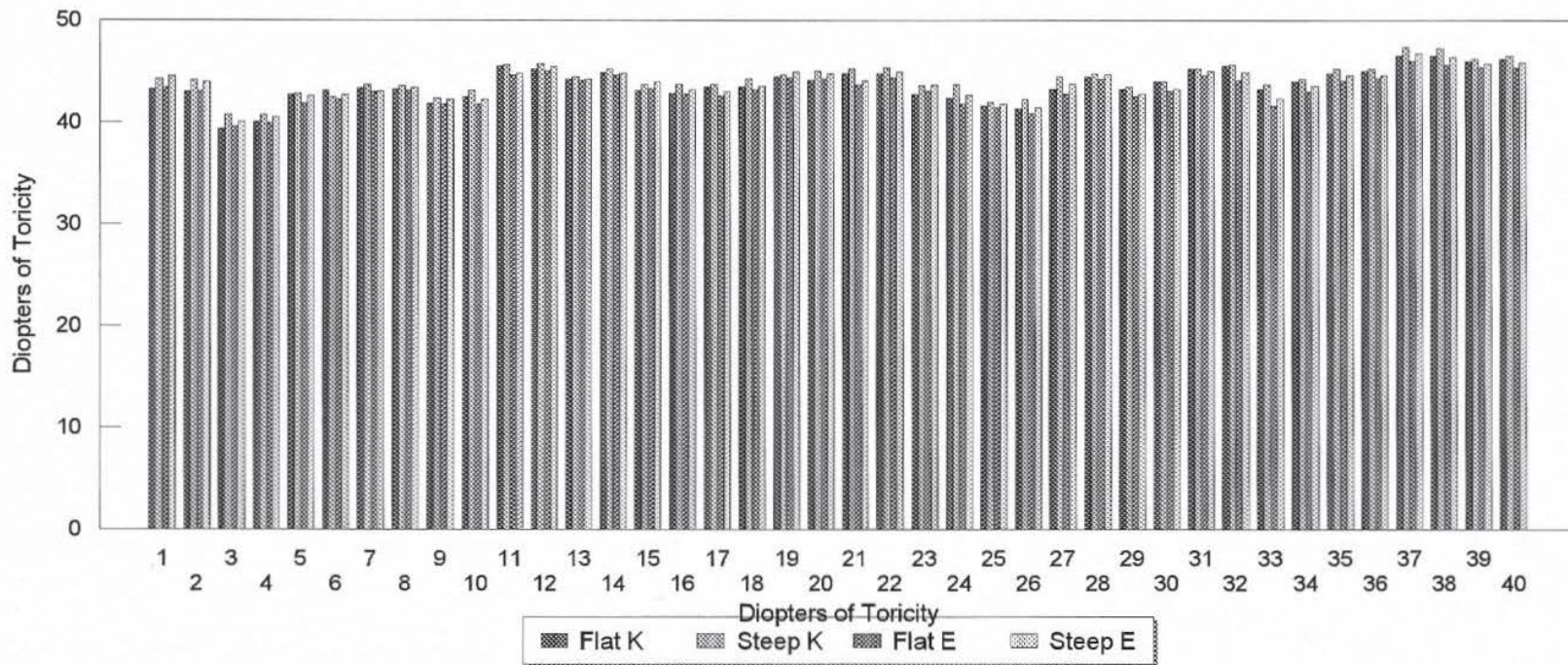


Figure 1