

Cycloplegic Versus Manifest Refractions

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With the precedent set by the New Brunswick Optometric Association and upcoming changes in drug legislation in several western provinces; optometrists across Canada are becoming increasingly aware of the use of diagnostic pharmaceuticals. The following report compares the refractive status of 423 eyes when examined by manifest and cycloplegic refractions. The subjects ranged in age from 2 to 89 years, and 62% were female.

Each patient had a manifest refraction performed by the author. The patient then received 2 drops of 1% tropicamide (Mydracyl) O.U., and the refraction was reformed by the same practitioner 20 to 25 minutes later. Table 2 shows the average difference between cycloplegic and manifest refractions.

Tropicamide is a rapidly acting antimuscarinic drug. It inhibits the action of acetylcholine on structures innervated by postganglionic cholinergic nerves and acts on muscarinic receptors. Tropicamide has a short duration of action, therefore, one must be careful that the refraction is performed during the time interval which is 20 to 25 minutes after instillation.

According to Havener¹, residual accommodation should not exceed 2.00 D for a satisfactory cycloplegic refraction. After the instillation of 1 drop of 1% solution of tropicamide, he found varying degrees of residual accommodation, but with 2 drops of 1% solution of tropicamide O.U. he found all eyes met the above requirements. Therefore I used 2 drops of 1% solution of tropicamide O.U. in this study.

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TABLE 1

Makeup of Each Group in Table 2

Group	Dioptric	Values
A	greater than	-6.12D
B	-4.12D	-6.00D
C	-2.12D	-4.00D
D	-0.12D	-2.00D
E	+0.12D	+2.00D
F	+2.12D	+4.00D
G	+4.12D	+6.00D
H	greater than	+6.12D

TABLE 2

Average Difference Between Cycloplegic and Manifest Refraction

group	A	B	C	D	E	F	G	H
no. in group	19	35	80	98	143	30	14	4
average change	+0.27	+0.14	+0.02	0.00	-0.02	-0.20	-0.30	-0.41

It can be seen by the data in Tables 1 and 2 that not only is a manifest refraction less than a cycloplegic refraction in high hyperopes as would be expected, but surprisingly, it is also less in high myopes. A plus sign indicates a cycloplegic refraction higher than a manifest refraction and vice versa for a minus value. This means that a +5.50 cycloplegic will show as a +5.00 manifest; or on the other hand, a -5.25 cycloplegic will show as a -5.00 manifest. These differences must be kept in mind before a final prescription is written (remembering that a refraction is by no means the final prescription).

This study represents a clinical sampling only. Since tropicamide tends to have a greater mydriatic than a cycloplegic effect, perhaps further research might attempt to differentiate the role of mydriasis compared to cycloplegia in producing the results observed in this study.

References

1. Havener, W.N., Ocular Pharmacology., St. Louis, C.V. Mosby Co., Fourth edition, 1978, pp 257 - 61.
2. Vale, J. and Cox, B., Drugs and the Eye., London - Boston, Butterworths Co., 1978, pp 21 - 36.
3. Fraunfelder, F.T., Drug-induced Ocular Side Effects and Drug Interaction., Philadelphia, Lea and Febiger Co., 1976, p 254.