

Effect of Ambient Lighting on Visual Field Testing

Lacie Hale, Lauren Hendrickson, Joseph Shetler, OD
Northeastern State University Oklahoma College of Optometry

Abstract

Purpose. The objective of this study is to determine if room illumination levels above manufacturer’s recommendations will create a statistically significant difference in visual field testing results while identifying acceptable room illumination ranges that provide comparable field results.

Methods. Thirty-one individuals between the ages of 21-58 years participated in automated visual field testing (24-2 SITA Fast, Humphrey-Zeiss) under two different lighting conditions: 3.15 lux and 260 lux.

Results. Using Anderson’s Criteria, the VF’s were analyzed for reliability, thus four subjects’ VF’s were not utilized due to unreliability and not computed in the final data.

Conclusion. Overall, the findings of this study do not indicate a significant difference in visual field results with room illumination levels higher than that of manufacturer’s standards.

Introduction

The HFA has manufacturer recommended room illumination levels of 3.15 asb; however, these levels are not closely adhered to in a clinical optometric setting. For instance, the majority of clinicians and offices do not precisely measure the lighting condition of the room with a lux meter before administering a visual field test. The Humphrey Field Analyzer user manual allows for variation in ambient lighting conditions as it also states:

You should perform your testing with the HFA II-i in a dimly lit room. There should be enough light present to ensure safety of the user and the patient. Any light present during the test should be directed away from the patient and the HFA II-i bowl opening.

The objective of this study is to determine if room illumination levels above manufacturer’s recommendations will create a statistically significant difference in visual field testing results while identifying acceptable room illumination ranges that provide comparable field results.

Methods

Participants’ visual acuity was tested with an ETDRS chart to ensure a best corrected visual acuity of 20/40 or better. All thirty-one participants met the acuity requirements. After visual acuity testing, two successive visual field tests using the SITA Fast algorithm were performed on the right eye only.

Room illumination was measured at 3.15 lux (Figure 1) and 260.1 lux (Figure 2). The first testing condition was determined by random draw for each participant. Participants had a light adaptation period for a minimum of three minutes before instructions began for the first visual field. After completion of the first field, participants were light adapted to the second room illumination condition. Upon completion of the second visual field, participants were released.

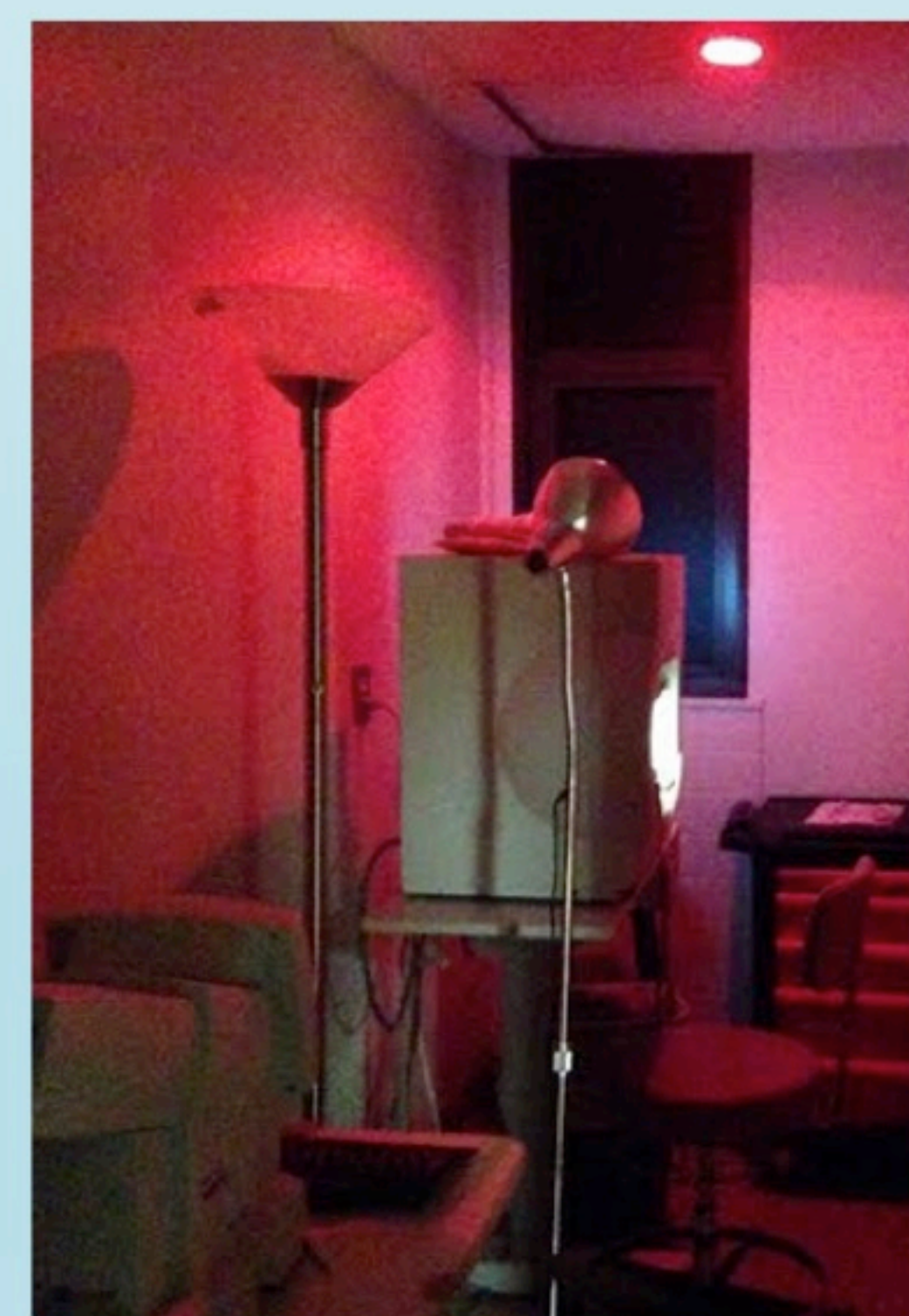


FIGURE 1. Ambient lighting set at 3.15 lux, “dim condition,” replicating manufacturer guidelines.



FIGURE 2. Ambient lighting set at 260.1 lux, “bright condition.”

Results

Based on Anderson’s Criteria, four female participants’ data was discarded due to unreliability. A paired two sample t-test was subsequently performed on twenty-seven visual field results. A p-value of less than 0.05 was considered statistically significant. A list of the visual field indices showing mean and standard deviation for each index along with p-value can be seen in Table 1.

Visual field indices	260 lux (n = 27)	3.15 lux (n = 27)	P(T<=t) two-tail
Mean Deviation (dB)	-2.2 ± 0.9	-2.3 ± 0.9	0.66
Pattern Standard Deviation (dB)	1.4 ± 0.2	1.4 ± 0.2	0.84
Fixation Losses (%)	0.0 ± 0.0	0.1 ± 0.1	0.06
Time Duration (min)	3.6 ± 0.3	3.6 ± 0.4	0.88
False Negative Answers (%)	0.0 ± 0.0	0.0 ± 0.0	0.16
False Positive Answers (%)	0.0 ± 0.0	0.0 ± 0.1	0.78
Pupil Size (mm)	4.5 ± 0.8 *	4.1 ± 0.8 *	0.00

* Statistically significant difference (P < 0.05).

Table 1. Mean visual field indices obtained in ambient room illumination of 260 lux and 3.15 lux with standard deviation and p-values.

Discussion

Overall, the findings of this study do not indicate a significant difference in visual field results with room illumination levels higher than that of manufacturer’s standards. Ambient room lighting conditions between 3.15 lux and 260 lux will provide similar findings for individual patients’ visual field results. This study only used patients between the ages of 21-58 who were in good health and did not have existing ocular pathology. The results of this study therefore are only applicable to patients falling within that age range and are without ocular pathology.