

Comparative Evaluation of the new Easyton Transpalpebral Tonometer and Diaton Transpalpebral Tonometer

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INTRODUCTION

Measurement of intraocular pressure (IOP) has traditionally relied on corneal, applanation, and indentation measurement procedures. However, direct corneal measurements have many limitations which can be eliminated by using transpalpebral approaches to measurement of intraocular pressures.

Currently, there is limited published data, regarding the new Easyton tonometer and its measurement properties in comparison to the well established transpalpebral Diaton tonometer.¹

This study offers early data, directly comparing IOP values collected using the new Easyton transpalpebral tonometer with IOP values collected using the Diaton tonometer.

OBJECTIVES

1. Describe the relationship and measurement properties between IOP values measured by the Easyton Tonometer and Diaton Tonometer.
2. Determine if IOP measurements made by the Easyton and Diaton transpalpebral tonometers are sufficiently similar to substitute one for the other.

METHODS

Study design: Balanced, two-factor, repeated measures, experimental research design. Factor one, EYE was fixed and contained two levels, right and left. Factor two, TONOMETER was fixed and contained two levels, Easyton and Diaton.

Procedures: Healthy, students, enrolled in the NSU Health Professions Division Programs were recruited for voluntary participation.

All measurements were completed in accordance with standard measurement procedures, recommended by the tonometers' manufacturers.

Five measurements were collected from each eye (R & L), with each of the two tonometers (Easyton & Diaton), for each subjects.

The five measurements were averaged for each of the four research conditions and submitted to statistical analysis.

RESULTS

Subjects: N=75, eyes=150, age, mean years= 25.32 (SD 3.7), gender, females=43, males=32.

Main results: Two-way ANOVA with repeated measures revealed no statistically significant interaction between EYES and TONOMETERS ($F(1,299)=.001$ $P=.97$). There was no statistical difference between the right and left eyes.

There was a statistically significant difference between Easyton and Diaton IOP measurements $F(1,299)=52.21$ $P<.001$.

Easyton values (Mean 16.77(SD 1.98) mmHg) were marginally higher than Diaton values (Mean 14.67 (SD 2.95) mmHg).

The mean difference between Easyton and Diaton values was 2.1 mmHg.

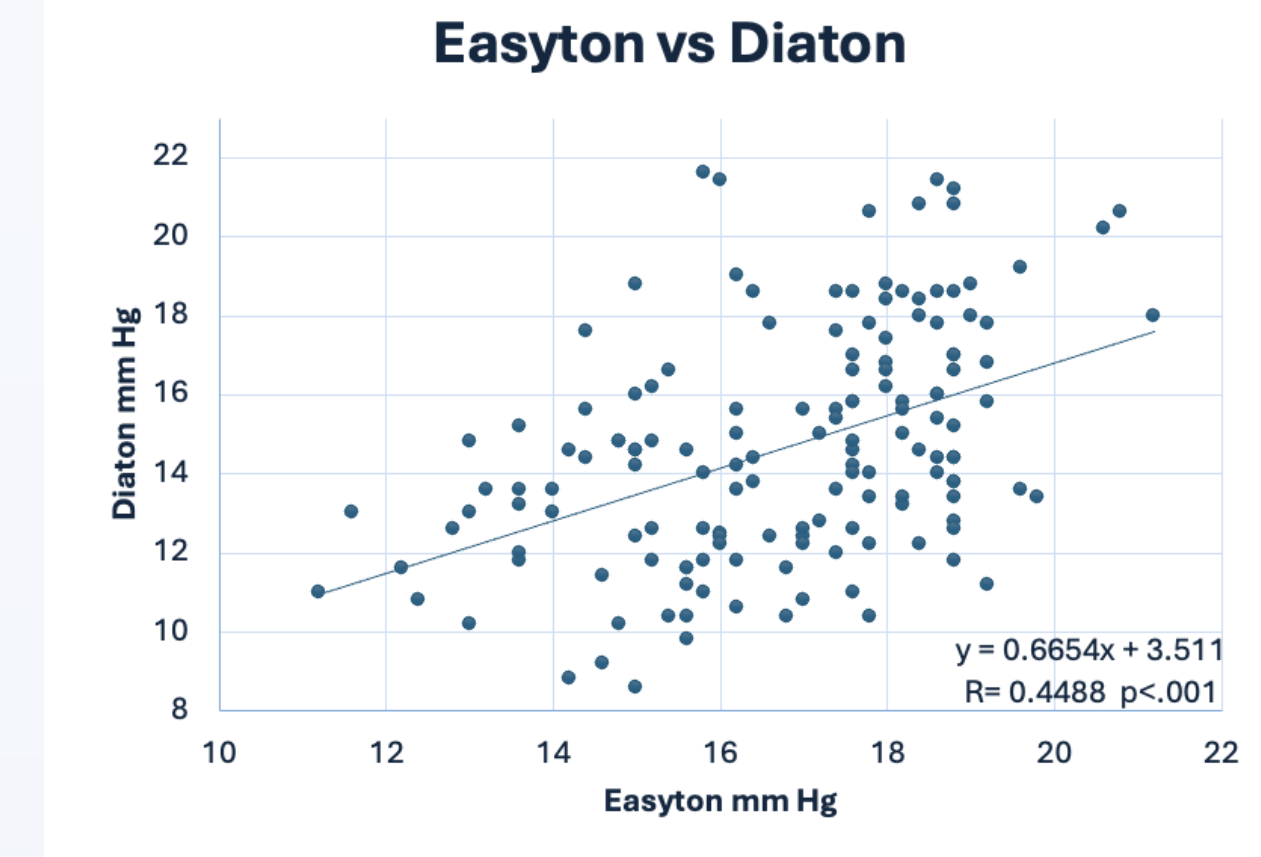


Figure 1: This scatter plot demonstrates the relationship between intraocular pressure (IOP) measurements obtained using Easyton and Diaton devices. Each point represents an individual measurement. The trend line indicates a positive correlation ($y = 0.6654x + 3.511$), with a correlation coefficient (R) of 0.4488, which is statistically significant ($p < .001$).

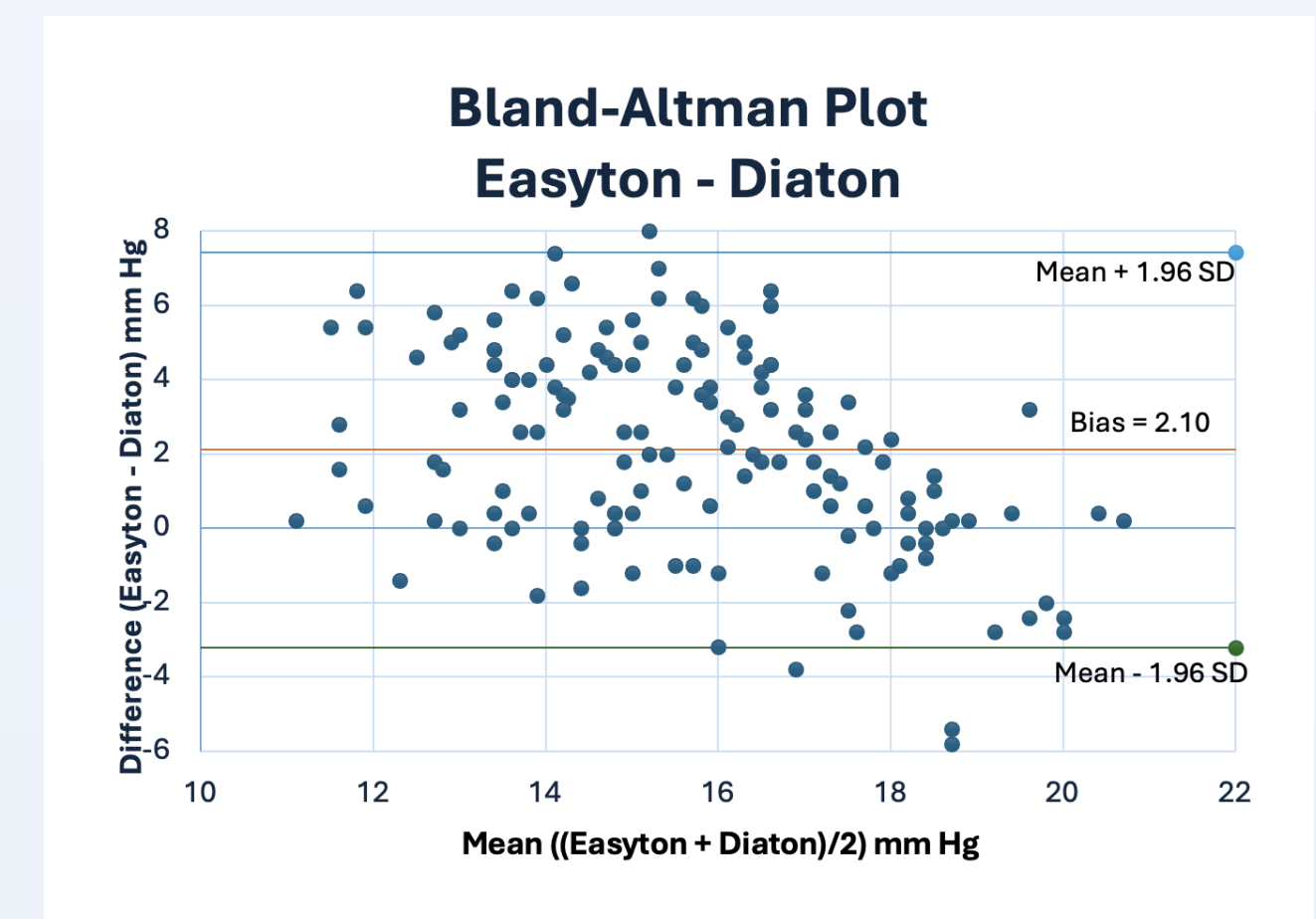


Figure 2: This Bland-Altman plot assesses the agreement between intraocular pressure (IOP) measurements obtained using Easyton and Diaton devices. The mean difference (bias) between the two methods is 2.10 mm Hg. The limits of agreement (mean \pm 1.96 SD) are represented by the blue and green lines, indicating the range within which 95% of differences between the two measurement methods fall.



Figure 3: Demonstration of IOP taken by Easyton from the outer eyelid in the midline axis 2-3 mm above the eyelash line, with subject's head perpendicular to the tonometer. (Image is sourced from ELAMED Easyton seller)

CONCLUSIONS

Intraocular pressures measured directly from the eyelid by the new Easyton transpalpebral tonometer were statistically higher than mean IOP measured directly from the eyelid by the Diaton transpalpebral tonometer. However, from a clinical perspective, the two instruments generate similar IOP values, in a healthy, young adult population.

The Easyton and Diaton transpalpebral tonometers generate sufficiently similar values to allow one to be substituted for the other, when measurement values are within the normal range (10-21 mmHg).

ACKNOWLEDGEMENTS

Funding for this project was provided by an internal Nova Southeastern University, Health Science Professions Divisions Research Grant, *Innovative Measurement of Intraocular Pressure with Potential Applications for Use in Underserved Populations and Developing Countries*. NSU-IRB Protocol # 2023-236.

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