A New Visual Acuity Test for Use in Children age 4-17

Guy Barnett-Itzhaki[1,2], Zohar Barnett-Itzhaki[3,4] and **Noa Ela-Dalman[1,2]**

(1) Sackler faculty of Medicine, Tel Aviv University, (2) Pediatric Ophthalmology and Strabismus Service, Meir Medical Center

(3) Public health services, Israeli Ministry of Health, (4) Faculty of engineering, Research Center for Health Informatics, Ruppin Academic Center

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Introduction

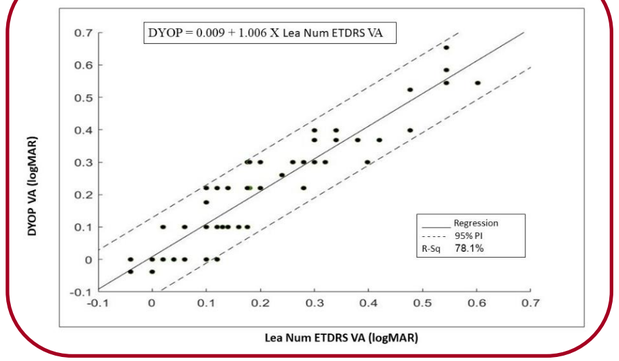
A century and a half ago, Herman Snellen, developed a chart for vision testing. This chart has been adopted worldwide and is widely used since then. Although the computer age has encouraged the development of new approaches and platforms to measure visual acuity, they mainly reflect the original Snellen charts and they do not pose a genuine novel approach for acuity tests. Recently, a new chart using a dynamic target visual assessment tool was developed. This chart, called the Dynamic Optotype chart (DYOP) uses a segmented, circular figure composed of equally spaced gaps/segments that spin at a constant velocity.

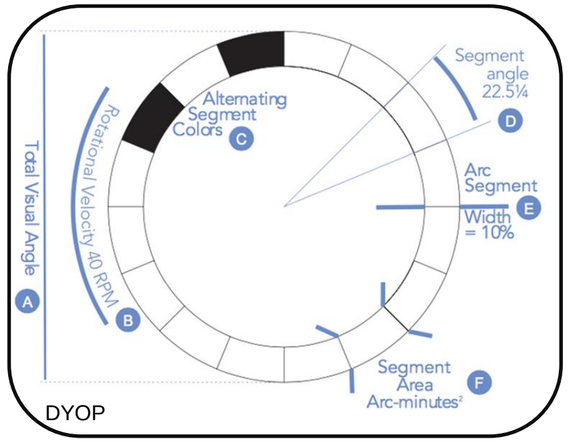
Our study goal was to evaluate the DYOP chart. Children were tested with the DYOP visual acuity test and the ETDRS Lea numbers chart. The results of both tests were compared.

Design and Methods

- Prospective study.
- Consecutive patients ,ages of 4 - 17 years**,** presenting for eye examinations at the Pediatric Ophthalmology section of Meir Medical Center.
- N=157: 76 males and 81 females, mean patient age: 8.4 years (±2.88 years); range: 4–17 years
- Visual acuity in at least one eye in the range 6/4.8 to 6/60 as determined previously with Lea numbers ETDRS chart
- Distance visual acuity was determined monocularly using both the Lea numbers ETDRS chart and the Dyop test , alternating the order of administration between patients; The worst-seeing eye of each patient was tested.

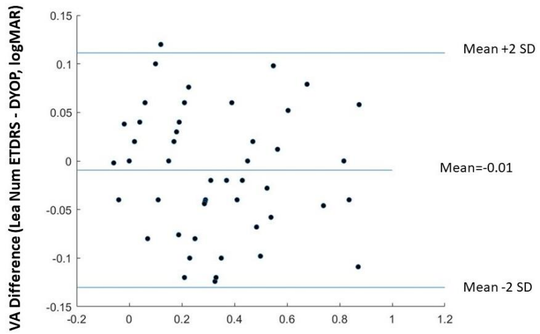
Linear regression of the DYOP against Lea Num ETDRS



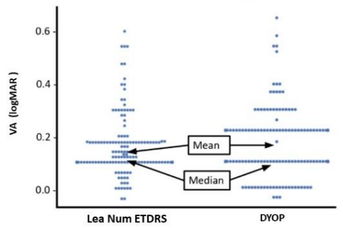


Bland–Altman plot

Monocular acuity difference as a function of the mean acuity for each participant



Raw acuity data from the Lea Num ETDRS chart and the DYOP test for each patient



- Best-corrected logMAR visual acuity range: -0.04 to 0.602 (ETDRS), -0.038 to 0.653 (DYOP)
- Mean ±SD logMAR VA 0.1633 (6/8.75) ±0.129 (DYOP), 0.154 (6/8.55) ±0.113 (ETDRS), p = 0.052

Conclusions

- A strong linear correlation (*r* =0.88) between the visual acuity measures was found . The mean difference in acuity was -0.01 (95%,CI) -0.02 to 0.01.
- The 95% limits of agreement were ±1.2 lines. The logMAR, equivalent was about less than 1 letter.
- The DYOP test underestimated vision (not clinically significant) relative to the Lea numbers ETDRS chart.
- The results of this study, the first prospective study in pediatric population, support the DYOP eye chart as a valid measure of visual acuity among pediatric patients 4 to 17 years-of-age, with vision ranging from 20/16 to 20/200.

References

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