Near Point of Convergence (NPC) Among Healthy Secondary School Students in Southwest Nigeria

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Background: The near point of convergence is the point at which lines of sight are directed when convergence is maximum.[1] The assessment of near point of convergence (NPC) is an important examination in the assessment of non strabismic binocular vision abnormalities. It is an important component in comprehensive eye evaluation and is also considered a diagnostic finding in the assessment of convergence insufficiency.[2,3,4] It is also a diagnostic tool in evaluating traumatic brain injury. There is a huge variation in the normative data established for ophthalmic parameters of Near point of Convergence because of the differences in measurement technique. There is paucity of data for normative values in Nigeria hence the need to establish the normative values for Near Point of Convergence (NPC) among healthy secondary school students in southwest Nigeria.

Methods: This was a descriptive cross-sectional study was conducted among 8-21year old students in September/March 2016. A multistage sampling was used to pick a representative sample of students in public senior and junior secondary schools in Ido Local Government Area Ibadan. Eligible students with Visual acuity $\geq$ 6/9in both eyes, normal ocular findings with no strabismus or non-strabismus binocular disorders were recruited. NPC was measured with RAF rule line, RAF rule accommodative target, penlight, and tip of pen.

Results: A total of 1393 students participated in the study. Mean age was 14.54 ± 2.11 years. The mean break values for RAF rule line, RAF Accommodative target, Penlight and tip of pen were 5.98 ±1.32cm, 6.37 ±1.40cm, 5.61 ±

1.36cm and 6.13±1.40cm respectively while the mean recovery findings for RAF rule line, RAF Accommodative target, penlight and tip of pen were 7.04±1.54, 7.40 ±1.60cm cm 6.45 ± 1.89cm and 7.10±1.80cm respectively. A
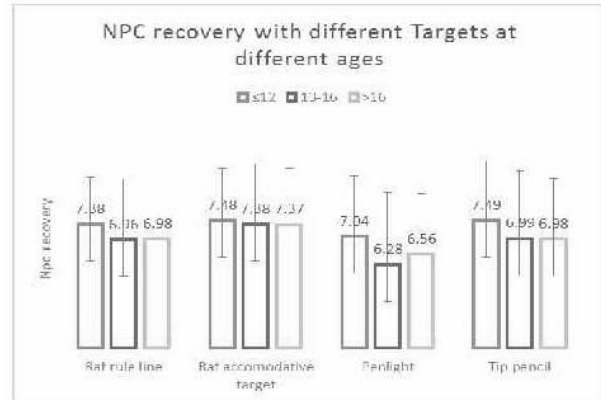

Fig. 1: NPC break with different targets at different ages

Fig. 2: NPC recovery with different targets at different ages

statistically significant difference between NPC break and recovery values was found between the different targets used, with accommodative targets giving more remote values (Figures 1 and 2).

Conclusion: A statistically significant difference in value was found in NPC break and recovery when comparing the different targets used, as reported in previous studies[5-7]. This was not the case however with Siderov[8] who conducted a study among optometry students and he found no significant difference among presbyopic individuals. He then concluded that for subjects with little or no accommodation the NPC value is independent of the target used. Scheiman et al[5],

obtained lower break and recovery mean values compared to ours. This may be explained by the differences in age population (9-52years), different study participants (optometry students) and different targets used (Bernell Accommodative rule, penlight with red green filter). While Ovenseri-Ogbomo[9] in Benin reported values similar to this study for break and recovery respectively, however, the test target used was not clearly stated. Abraham[10] obtained slightly higher break values using the red green filter penlight target. This study has also established that the values obtained during measurement of Near Point of Convergence are affected by target type used.

References

1. Dunnington J H. A new classification of the motor anomalies of the eye based upon physiological principles together with their symptoms, diagnosis and treatment. Arch Ophthalmol [Internet]. 1942;28(5):958. Available from: http://dx.doi.org/10.1001/archopht.1942.00880110206020

2. Cooper J, Duckman R. Convergence insufficiency: incidence, diagnosis, and treatment. J Am Optom Assoc [Internet]. 1978 Jun [cited 2015 Jul 7];49(6):673–80. Available from: http://www.ncbi.nlm.nih.gov/pubmed/355298

3. Daum KM. Convergence insufficiency. Am J Optom Physiol Opt [Internet]. 1984 Jan [cited 2015 Jul 7];61(1):16–22. Available from: http://www.ncbi.nlm.nih.gov/pubmed/6702996

4. Daum KM. Characteristics of convergence insufficiency. Am J Optom Physiol Opt [Internet]. 1988 Jun [cited 2015 Jul 7];65(6):426–38. Available from: http://www.ncbi.nlm.nih.gov/pubmed/3046362

5. Scheiman M, Gallaway M, Frantz K a, Peters RJ, Hatch S, Cuff M, et al. Near point of convergence: test procedure, target selection, and normative data. Optom Vis Sci [Internet]. 2003 Mar 1 [cited 2015 May 14];80(3):214–25. Available from: http://www.researchgate.net/publication/10855223_ Nearpoint _of_convergence_ Test_ procedure_ target_ selection_ and_ normative _ data

6. Rouse MW, Borsting E, Hyman L, Hussein M, Cotter SA, Flynn M, et al. Frequency of convergence insufficiency among fifth and sixth graders. The Convergence Insufficiency and Reading Study (CIRS) group. Optom Vis Sci. 1999;76(9):643–9.

7. Maples WC, Hoenes R. Near point of convergence norms measured in elementary school children. Optom Vis Sci. 2007;84(3):224–228.

8. Siderov J, Chiu SC, Waugh SJ. Differences in the near point of convergence with target type. Ophthalmic Physiol Opt [Internet]. 2001 Sep [cited 2016 Apr 29];21(5):356–60. Available from: http://www.ncbi.nlm.nih.gov/pubmed/11563422

9. Ovenseri-Ogbomo GO, Eguegu OP. Vergence findings and horizontal vergence dysfunction among first year university students in Benin City, Nigeria. J Optom. 2016;

10. Srinivasan K, Thomas J, Abraham N. Normative data for near point of convergence, accommodation, and phoria. Oman J Ophthalmol [Internet]. 2015 Jan [cited 2015 May 14];8(1):14. Available from: http://www.ojoonline.org/text.asp?2015/8/1/14/149856