



To compare the effectiveness of dynamic optotype and LogMAR visual acuity chart among cataract patients

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Abstract

Background: Dynamic Visual acuity is described as the visual acuity which is evaluated with motion; which required in Ophthalmic and Optometric routine eye evaluation. LogMAR chart is widely used in ophthalmic and Optometric investigation, although it's an excellent visual acuity chart but its unable to evaluate dynamic visual acuity.

Aim: To compare the effectiveness of dynamic Optotype visual acuity chart and logMAR visual acuity chart on cataract patient.

Methodology: This was a descriptive study limited to individual aged 50 years & above who were selected for cataract surgery & brought to Sankara eye hospital Ludhiana from different locations of Punjab. Patient excluded from the study were those who had surgery for traumatic cataract, pterygium, corneal pathology & retinal pathology. Data was collected over 3-month period from January 2020 to March 2020. The case sheet of Sankara eye hospital was used to record the following: Demographic data, visual acuity, current prescription & other existing ocular pathology.

Result: 75 subjects were included for the study out of which 35 (46.67%) were male and 40 (53.34%) were female. The mean age of the subjects was 63.8 ± 6.12 years. Out of the 92 eyes, 20 were prescribed glasses and 72 were left uncorrected at the baseline. The prescribed group at baseline was considered as Controls and the non-prescribed group at baseline was considered as Cases.

Conclusion: The result of dynamic optotype visual acuity and LogMAR are similar in visual acuity measurements. There is hardly any difference between both optotypes. As this study was performed. The visual acuity was almost identical in LogMAR and dynamic visual acuity test. The time taken to perform dynamic optotype chart was less. So, the study concludes that dynamic optotype is faster visual acuity chart which is equivalent to LogMAR and productive with illiterate population.

Keywords: dynamic optotype, VA (visual acuity), LogMAR chart

Introduction

Measurement of Visual acuity is first and foremost optometric and Ophthalmic evaluation for every patient whoever visits for Ocular examination, the documentation of visual acuity is essential to maintain the ocular health and visual impairment (Bastawrous *et al.*, 2015) ^[1]. Cataract causes scattering of light in the eye resulting in low contrast sensitivity, glare & reduced VA. In 2008, Allan Hytowiz discovered that a uniformly spinning segmented ring could provide a strobic visual stimulus as an optotype. Unlike static optotypes which get increasingly blurry as they get smaller or further away, a spinning/rotating dynamic optotype had a significantly sharper threshold as to the acuity endpoint based upon the angular arc width and viewing distance ^[2]. The circular dynamic optotype segmented ring typically is comprised of 8 black and 8 white equally sized alternating segments on a neutral gray background, spinning at 40 rotations per minute.

Methodology

This was a descriptive study limited to individual aged 50 years & above who were selected for cataract surgery & brought to Sankara eye hospital Ludhiana from different locations of Punjab. The setting of the study was the camp screening department and the refraction ward of Sankara Eye Hospital Ludhiana. All the subjects were explained about the process involved in the study and informed consent was taken. The subjects were involved in the study based on the inclusion and exclusion criteria of the study Patient excluded from the study were those who had surgery for traumatic cataract, pterygium, corneal pathology & retinal pathology. The chart 2020 software was installed in a laptop device model Acer Swift 3 i5 14-inch full HD LED display. Visual acuity was measured by using LogMAR chart and by using dynamic optotype chart at standard two-meter distance calibrated according to the software used. Data was collected over 3-month period from January 2020 to March 2020. The case sheet of Sankara Eye Hospital was used to record the following: Demographic data, visual acuity, current prescription & other existing ocular pathology. Visual acuity was measured by using LogMAR and dynamic optotype chart with constant room illumination, measuring distance and same laptop device for

every patient. The time required by the patient to responded to the LogMAR acuity chart and dynamic optotype chart was recorded. The distance visual acuity was measured by occluding one eye also the pinhole acuity and contrast acuity was measured. For dynamic optotype patient sees two random rotating circle out of which patient had to respond the direction of rotation of the circle.

Result

75 subjects were included for the study out of which 35 (46.67%) were male and 40 (53.34%) were female. The mean age of the subjects was 63.8 ± 6.12 years. Out of the 92 Eye, 20 were prescribed glasses and 72 were left uncorrected at the baseline. The prescribed group at baseline was considered as Controls and the non-prescribed group at baseline was considered as Cases. Comparison was done using "students- t "test. The mean spherical equivalent assessed with Cycloplegic refraction at baseline visit, six months and 1 year visit were $-0.31\text{DS} \pm 0.18\text{DS}$, $-0.36 \pm 0.21\text{DS}$ and $-0.45 \pm 0.25\text{DS}$ in the Not prescribed group. The mean spherical equivalent assessed with Cycloplegic refraction at baseline visit, six months and 1 year visit were $-0.69\text{DS} \pm 0.11\text{DS}$, $-0.69 \pm 0.11\text{DS}$ and $-0.71 \pm 0.09\text{DS}$ in the prescribed group. Mann- Whitney U test was applied to find the difference between LogMAR and dynamic optotype for the right eye (U-2391.5, Z-1.580, P=0.1141), there was no significant difference between Log MAR and dynamic optotype visual acuity for right eye and the same was applied for the left eye. Mann- Whitney U test was applied to find the time difference between Log MAR and dynamic optotype (U-1233.5, Z-5.93315, P<0.00001), and there was a significant difference between the time that was recorded. Dynamic optotype took lesser time as compared to LogMAR.

Discussion

A study done by Marquez C. *et al.*, (2017) ^[3] on establishing normative change values in VA loss during the dynamic visual acuity test ^[3] It was based on static and dynamic visual acuity in pitch and yaw planes in which it was found that dynamic visual acuity decreased with head movement at 150* per second. The result came out to be that in all the conditions dynamic visual acuity test demonstrated the decrease in loss of visual acuity as compared to standard visual acuity. Similar study done by Jorge J. *et al* (2019). In a study conducted by Amer A. Al saif, Samira al Senany which was published in journal of physical therapy in 2004 had shown the correlation ^[4] However, in present study, there is no significant difference between the dynamic optotype and LogMAR values acuity in cataract patients. Another study was conducted by Subhan M. *et al* (2018) ^[5] on a new dynamic digital visual acuity device in two phases. First, they created a low cost productive, portable and a user friendly Digital Dynamic Visual Acuity Device (DDVA) and measure DVA. When the stratified analysis by gender was performed, the similar trend was noticed for both the genders. According to the above results, the study has shown statistically significant difference ^[5]. However, in current study found that cataract does not show much impact on DVA but on static visual acuity. And the time taken to perform static and dynamic visual acuity test found to be dynamic optotype was faster than LogMAR ^[6] A study done by Richard A. Roberts E. Gans on comparison of horizontal and vertical dynamic visual acuity in patients with vestibular dysfunction and non-vestibular dizziness to check static and dynamic visual acuity among all the participants ^[7]. There is a limitation in our study and can further be noticed in future studies. Nicolas P. Murray *et al* did a study to create a standard for dynamic visual acuity tests ^[8] but in present research study, there was no as such coefficient observed. Ramaioli C. *et al* in 2019 did an experimental study on vestibulo ocular response ^[9]. They did not have similar results for horizontal rotation and translation, current study had no relation with head rotation and translation, this can be address in future studies. In 2015, Natasa Vuiko Muzdalo did a study on measurement of dynamic visual acuity with augmenting landolt rings ^[10] similarities are seen in present study. Populated country such as India has very high number of Cataract patients such studies are required to fasten the vision screening.

Conclusion

The circular dynamic optotype segmented ring typically is comprised of 8 black and 8 white equally sized alternating segments on a neutral gray background, spinning at 40 rotations per minute. Static VA like LogMAR chart. The current study showed that we got so many patients with different types of Cataracts in which we tried to compare the visual acuity with LogMAR and Dynamic optotype. This concluded that dynamic visual acuity and LogMAR are similar in visual acuity measurements. There is hardly any difference between both optotypes. The time taken to perform dynamic optotype test was less. So, the current study concludes that Log MAR and dynamic optotype are equal. On the other side, it also concludes that dynamic optotype takes less time as compared to LogMAR visual acuity. Therefore, dynamic optotype can be said that it is a useful and faster screening tool.

Reference

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