

Role of Cycloplegic Refraction in Evaluation of Refractive Power in Children between 6-14 Years

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Abstract: Background and Objectives: A refractive error is a major cause of treatable visual impairment. Various refractive techniques with accommodation control have been proposed. Cycloplegic retinoscopy is the gold standard for objective refraction compared to Autorefractors. Methods: The study was conducted on 200 eyes from 52 patients with diminution of vision, headache, or asthenopia. Noncycloplegic autorefractometry was done followed by cycloplegic retinoscopy using Heine Streak Retinoscope. The results were analysed using Paired Student t-Test and Bland-Altman plots. Results: Bland-altman plots are used to compare spherical, cylindrical, and axial components P value of less than 0.005 is considered to be statistically significant. In my study P values are Sphere- 0.000, Cylinder- 0.000, Axis- 0.000. It proves that there is a statistically significant difference between autorefractometer and cycloplegic retinoscope in assessing the refractive errors. Interpretation and Conclusion: The results confirm that retinoscopy is more accurate than autorefractometry.

Keywords: Refraction; Visual Acuity; Refractive Errors; Retinoscopy; Refractometry; Accommodation; Myopia; Hyperopia; Astigmatism

1. Introduction

Refractive errors prevalence in children has been researched extensively.

Refractive errors are a major problem and form a large part of all ocular problems in Asia and Western part of the world. Detecting them as early as possible and correcting them in infants and children is very important.

Measurement of refractive errors can be done with different techniques of refraction, along with various methods of control of accommodation.

The objective techniques of assessment of refractive errors include the traditional retinoscopy & the recent autorefractometry, without or with control of accommodation by cycloplegia.

Cycloplegic retinoscopy is the gold standard technique in the detection of refractive errors and in cases of amblyopia or strabismus, especially

However, automatic refractometers have gained popularity in recently as they give fast results, are easy to operate and an increasing faith of patient in sophisticated mechanical devices.

In various studies conducted previously for comparing different methods of refraction, there was a lot of debate with regards to their accuracy in determining the refractive errors.

Comparing these studies may not be accurate as different methods of control of accommodation might and various clinical methodologies might have been used for each technique.

The aim of this study is assessing the accuracy of autorefractometry & retinoscopy, with and without using cycloplegia and comparing these two in determining the final subjective binocular dioptric acceptance. We hope to find the most accurate objective technique of refraction, in order to facilitate the use of a single technique which is

standard in the specialized eye care as well as the community.

2. Objective

To prove that traditional cycloplegic retinoscopy is better than automated refractometer in determining refractive status in children.

3. Methodology

- 1) A total of 100 patients were included in the study. In the sample, 54 are males and 46 are females. The mean age was 6 to 14 years.
- 2) Each subject recruited in the study was explained in detail all the aspects of the
- 3) in the language they best understood, and a written informed consent was then acquired.
- 4) Noncycloplegic autorefractometry was performed in each eye with a standardized protocol
- 5) Assessment of distance visual acuity in each eye using the standard Snellen's Chart at 6m was done.
- 6) Cycloplegia was attained by homatropine 1%.
- 7) Cycloplegic autorefractometry was then performed after 1 hour following the instillation of the last protocol. The result was recorded under the head of CA in terms of various refractive parameters.
- 8) Cycloplegic retinoscopy was then performed using the same Heine Streak Retinoscope with a standardized protocol. However, an additional correction factor (0.50 D) and (1.50D) compensating for induced cycloplegia and hand distance was subtracted from the cycloplegic retinoscopic endpoints. The retinoscopic refractive correction following cycloplegia was recorded under the CR head in terms of various refractive parameters.
- 9) The patient was reviewed again after one day for verification of the final binocular subjective acceptance and an appropriate refractive correction was prescribed

4. Results

Bland-altman plots is used to compare spherical, cylindrical, and axial components

P value of less than 0.005 is considered to be statistically significant

In my study P values are

Sphere- 0.000

Cylinder- 0.000

Axis- 0.000

It proves that there is a statistically significant difference between autorefractometer and cycloplegic retinoscope in assessing the refractive errors.

5. Discussion

Emmetropia is the condition in which there is considered to be an absence of any refractive error because parallel beams of light come to focus point on the retina, with the accommodation at rest.⁵

Ametropia is a condition where the parallel light rays coming from infinity (with accommodation at rest), are focused either behind or in front or do not come to a point focus at all on the light-sensitive layer of retina. This includes:

- Myopia, (short sightedness)
- Hypermetropia, (long sightedness)
- Astigmatism.⁶

Weseman and Rassow conducted a similar study and concluded that autorefractometer is inferior to traditional retinoscopy when done by a experienced ophthalmologist.⁷

In 192 right eyes of healthy young individuals comparison of traditional retinoscopy and autorefractometer was done by Uras R et al . automated refractometer gave more positive and negative values than the subjective refraction. So, they concluded that streak retinoscopy is better in determining refractive errors than autorefractometer⁸

My studies show that cycloplegic retinoscopy refraction is more compatible in children compared to glasses given by non cycloplegic autorefraction.

Myopia is overestimated due to accommodation and hypermetropia is underestimated.

6. Conclusion

Traditional cycloplegic retinoscopy is better than non cycloplegic automater refractometry.

7. References

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