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Comparison of Autorefractors and Retinoscopy with Subjective Corrections in Myopia and Hypermetropia

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ABSTRACT: Since Autorefractors nowadays have become mainstream and available in almost all clinical setups Autorefractors to make measurements swiftly. So in such a situation , it is necessary to compare the results of different refraction measurement devices including Autorefractors and retinoscopy with subjective corrections in Myopia and Hypermetropia. This is a descriptive study done among 100 patients visiting Ophthalmology OPD with Myopia and Hypermetropia in Saveetha medical college selected by convenience Sampling . The data collect ed will be tabulated and analyzed using SPSS.Patients were divided into two age groups to find out age wise distribution of type of refractive errors and comparing the results from the subjective examination and results given by the Autorefractive meter it is clearly from this study that the difference between two methods was almost negligible and that Autorefractors are also a reliable method of measurement in a large clinical setup. But, on the other hand, manual retinoscopy still prove to be far better and efficacious technique yielding accurate results when it is used to check for refractive errors in individuals. In this study, we conclude that autorefractors are also reliable and can also be used to estimate refractive errors in a clinical setup, even though manual retinoscopy remains the most accurate and efficacious method.

KEYWORDS: Autorefractors, Retinoscopy, Subjective Corrections, Myopia, Hypermetropia

I. INTRODUCTION

Refractive errors occur when the shape of the eye prevents light from focusing directly on the sensitive layer of retina. Refractive errors are common cause of defective vision. Emmetropia is a condition where in parallel rays of light are focused on the retina when the accommodation is at rest. If the light rays are not focused on the retina but these are focused behind or in front of the retina, the person is unable to see the objects clearly and the condition is called ametropia. When the rays of light are focused behind the retina the condition is called hypermetropia and when the rays are focused in front of the retina the condition is called myopia.

Myopia and hypermetropia are further divided into various types namely axial, curvatural and index depending upon the causative factor involved. The extent to which the refractive system of the eye is faulty in focusing the rays of light on retina is called error of refraction.[1]

In highly populated country like India, a faster technique is mandatory to calculate refractive errors easily for the ophthalmic surgeon. The gold standard in evaluating refractive error is cycloplegic retinoscopy. However, retinoscopy is limited by the time required for the examination and patient discomfort.Now a days, autorefractors (ARs) have been widely used in objective evaluation of refractive status.

Closed-loop ARs use fogging technique to avoid accommodation during measurement. Although the efficiency of noncycloplegic autorefraction is reasonable, instrument myopia causing proximal accommodation may not be neutralized by fogging techniques. Hence, several studies have recommended measurements under cycloplegic conditions to ensure the accuracy of results.[2]

Table-mounted, hand-held, and video retinoscopy autorefractors are three popular automated devices that allow more rapid evaluations of refractive status.[3] Although these instruments can be used either with or without cycloplegia, cycloplegic refraction measurements should be preferred because of strong accommodation in children.[4]

The aim of the study was to compare the results of different refraction measurement devices including autorefractor and retinoscopy with subjective corrections in myopia and hypermetropia.

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II. MATERIALS AND METHODS:

100 eyes of 50 visually impaired children were evaluated in this study.Convenience sampling method were used. This study was conducted in Saveetha medical college and hospital.Patients visiting Opthalamology OPD with myopia and hypermetropia who were willing to participate were included in the study and tested for subjective correction in myopia and hypermetropia usingautorefractors and retinoscopy The data collected was tabulated and SPSS software was used for analysis. Inclusion criteriaincluded patients visiting Opthalmology OPD with myopia and hypermetropia in Saveetha Medical College who are willing to participate.Exclusion criteria included patients with other causes of defective vision like corneal opacity,lens changes,retinal diseases and glaucoma.

III. RESULTS

The total number of visually impaired children involved in this study is 50. All 50 were willing to participate in the study. As the refractive errors of two eyes in all patients were related, so only data from 100 right eyes of patients were analyzed. Patients were divided in two age groups to find out age wise distribution of type of refractive error. In group1 patients were < or equal to 10 years and in group2 patients were>10 years of age. Out of 100 patients, 37 were in group 1 and 63 were in group 2. In group1 among 37 patients 17 were myopic and 35 were hypermetropic. In group 2 among 63 patients 20 were myopic and 28 were hypermetropic. p value was <0.005 which was statistically significant (Figure 1).

Firstly results of spherical errors given by autorefractometer and subjective method were compared 30 myopic patients had mean and standard deviation of differences -0.15+0.87resulted in p value of 0.30 whereas 61 hypermetropic patients had mean and standard deviation of differences 0.16+0.14 resulted in p value of 0.184 When results of spherical errors given by retinoscopy and subjective method were compared 30 myopic patients had mean and standard deviation of differences -0.13+0.62resulted in p value of 0.306, whereas 61 hypermetropic patients had mean and standard deviation of differences 0.176+0.52 resulted in p value of 0.276.When results of spherical errors given by autorefractometer and retinoscopy and were compared 30 myopic patients had mean and standard deviation of differences -0.03+0.15 resulted in p value of 0.277 whereas 61 hypermetropic patients had mean and standard deviation of difference- 0.02+0.14 resulted in p value of 0.011*.

Secondly results of cylindrical errors given by autorefractometer and subjective method were compared 24 myopic patients had mean and standard deviation of differences -0.18+0.59 resulted in p value of 0.165 whereas 04 hypermetropic patientshad mean and standard deviation of differences -0.39+0.24 resulted in p value of 0.373.When results of cylinderical errors given by retinoscopy and subjective method were compared 24 myopic patients had mean and standard deviation of differences -0.22+0.77resulted in p value of 0.083 whereas in 04 hypermetropic patient had mean and standard deviation of differences 0.022+0.454 and resulted in p value of 0.696.When results of cylinderical errors given by autorefractometer and retinoscopy and were compared 24 myopic patients had mean and standard deviation of differences -0.14+0.82resulted in p value of 0.058 whereas 03 hypermetropic patients had mean and standard deviation of differences 0.040+0.46 resulted in p value of 0.500

Thirdly results of spherical equivalence given by autorefractometer and subjective method were compared 42 myopic patients had mean and standard deviation of differences -0.25+0.80 resulted in p value of 0.211 whereas 58 hypermetropic patients had mean and standard deviation of differences -0.0170+0.145 resulted in p value of 0.354.When results of spherical equivalence errors given by retinoscopy and subjective method were compared 42 myopic patients had mean and standard deviation of differences -0.12+0.78 resulted in p value of 0.320 whereas in 58 hypermetropic patient had mean and standard deviation of differences -0.155+0.57 resulted in p value of 0.023. When results of spherical equivalence errors given by autorefractometer and retinoscopy were compared 42 myopic patients had mean and standard deviation of difference -0.03+0.16 resulted in p value of 0.349 whereas 58 hypermetropic patients had mean and standard deviation of difference 0.23+0.35 resulted in p value of 0.373 (table 1)

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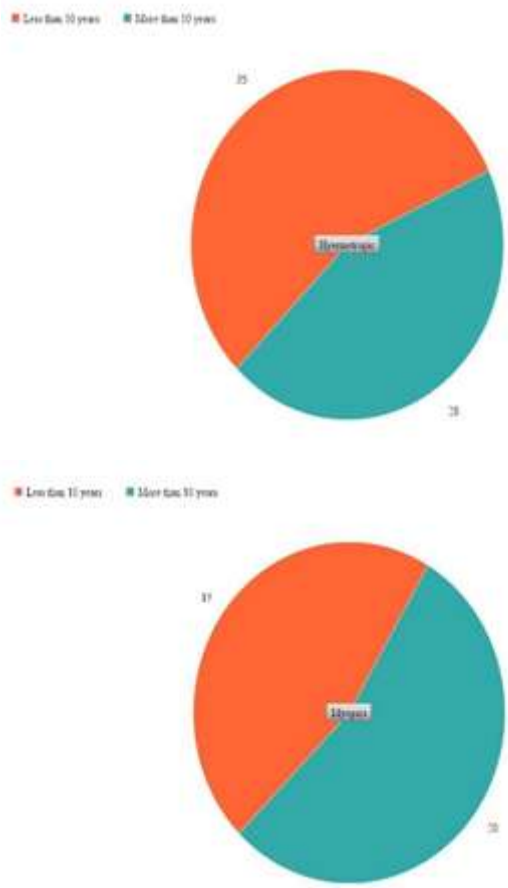

Figure 1

Table 1

Parameter			Myopic cases			Hypermetropic cases		
			N	MEAN + SD Of Difference	P value	N	MEAN + SD Of Difference	P value
Cycloplegia	Spherical	Autoref Vs Subjective	30	-0.15 ± 0.87	0.329	61	0.167 ± 0.144	0.184
		Retinoscopy Vs Subjective	30	--0.13 ± 0.62	0.306	61	0.176 ± 0.52	0.276
		Autoref Vs Retinoscopy	30	-0.03 ± 0.15	0.277	61	-0.02 ± 0.14	0.011
		Autoref Vs Subjective	24	-0.18 ± 0.59	0.165	4	-0.390 ± 0.24	0.373

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	Cylindrical	Retinoscopy Vs Subjective	24	-0.22 ± 0.77	0.083	4	0.022 ± 0.454	0.696
		Autoref Vs Retinoscopy	24	-0.14 ± 0.82	0.058	4	0.040 ± 0.463	0.500
	Spherical Equivalent	Autoref Vs Subjective	42	-0.25 ± 0.80	0.211	58	-0.017 ± 0.145	0.354
		Retinoscopy Vs Subjective	42	-0.12 ± 0.78	0.320	58	0.155 ± 0.57	0.023
		Autoref Vs Retinoscopy	42	0.03 ± 0.16	0.349	58	-0.23 ± 0.35	0.373

IV. DISCUSSION

In this study 100 patients with myopia and hypermetropia were tested using retinoscope, autorefractometer and subjective methods after using a cycloplegic.Refractive error is one of the most important preventable causes of blindness and therefore it proves right to use the best instrument for testing it. Therefore, this study was undertaken with the main aim of comparing the efficiency of retinoscopy, autorefractometer and subjective methods overeach other. The use of cycloplegic was because to neutralize the excess accommodative effort in individuals wearing glasses with minus over correction as it may lead to myopia.This point is also justified in a study by Hepsen IF et al, wherein it was observed that excess accommodation is one of the factors responsible for increased prevalence of myopia among children[6].

In this study, there is a closer agreement between results obtained using autorefractometer and other refraction methods regarding the cylindrical component and poorer agreement with regard to the spherical component. These findings are in line with findings of a study by Adyanthaya S et al and others.[5-8] In another study conducted by Adyanthaya S et al, although both retinoscopy and autorefractometer had comparable diagnostic accuracy, higher correlation was seen with retinoscopy for spherical error and higher correlation was seen with autorefractometer for cylindrical error and axis deviation[5]. In a study conducted by Jorge J et al, for the sphere power component, retinoscopy and subjective refraction had higher agreement and for cylindrical power and axis autorefractometer and retinoscopy had similar agreement.[7] This is unlike the results found in non cycloplegic conditions like the ones by Mukash SN et al and Hashemi H et al where it was be over minus in myopic and over plus in hyperopic cases.[9,10] In a study conducted by Verboven L et al, the results obtained through autorefractometers is superior and accurate than those obtained through retinoscopy and that it avoids the examination time required by physicians unlike retinoscopy.[11] Similarly in a study conducted by Choong YF et al, autorefractometer had higher sensitivity and specificity for myopia and hypermetropia.[2] In a study conducted by Hashemi H et al autorefraction gave plus results overall[10] and in a study conducted by Prabhakaran et al autorefraction gave minus results overall. The discrepancies in the results must be due to the difference in sample size and demographic composition of the study population.

In our study school going children was assessed for refractive status using conventional retinoscopy and autorefraction. The accuracy of the above objective methods was compared against subjective refraction.

Both retinoscopy and autorefraction had comparable diagnostic accuracy. However, better correlation was found with retinoscopy for spherical error, while autorefraction showed comparable correlation with subjective correction for cylindrical power and axisestimation.

In this study we thus conclude that although autorefractometers have good efficacy and is highly useful for testing refractive errors in a large clinical setup, manual retinoscopy is far better and efficacious technique yielding accurate results when used to check for refractive errors in individuals.This finding is also observed in several other similar studies done across the globe. In the study carried out by Adyanthaya S et al, they have

concluded that conventional retinoscopy is still the most accurate method for estimating refractive status and can be considered as a very good starting point for subjective refraction.[5]

V. CONCLUSION

In this study we thus conclude that although autorefractometers have good efficacy and is highly useful for testing refractive errors in a large clinical setup, manual retinoscopy is far better and efficacious technique yielding accurate results when used to check for refractive errors in individuals

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