

# COMPLIANCE OF THE STUDENTS TO THE REFRACTIVE ERRORS CORRECTION WITH GLASSES

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**ABSTRACT.** Purpose: we want to assess the compliance in school children aged between 5 to 12 years in the treatment of refractive errors by optical correction with glasses. Also we would like to emphasize different factors may influence children's decision. Materials and methods: in the time interval September 2011 - March 2012 we examined 1121 students and have found 315 patients with refractive ophthalmic pathology. We have recommended them wearing optical correction permanent. Patients received financial facility to purchase glasses. In the period February-March 2013 we have requestioned the 315 patients previously discovered. We watched students complemented the correction with glasses and possible causes that may be the cause of low compliant. Results and Discussion: Of the 315 students diagnosed with refractive ocular pathology 78 wore glasses in September 2011-March 2012 and 204 wore glasses in February-March 2013. This result represents an increase of 161% among students examined. Various causes can be incriminated for low compliance to treatment of the rest of 111 students. Conclusions: The study had a positive impact, managing to increase student compliance to treatment with 161%. By default, the future must look for new ways to improve these data, which actually reflects the quality of life for children.

**Keywords:** visual acuity, screening, children refractive errors, prevention results

## INTRODUCTION

Various studies conducted in different parts of the world and on the topic of children from different educational beaches, ethnic, age and gender concluded that: refractive errors are the main cause underlying vision problems in both children and adults. (Villarreal GM, et al., 2003; Zhao J, et al., 2000; Gopal PP, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Natdoo KS, et al., 2003). The prevalence of refractive pathology, and risk factors vary by geographic region and race (Villarreal GM, et al., 2003; Zhao J, et al., 2000; Gopal PP, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Natdoo KS, et al., 2003; Zao J, et al., 2002; Weale RA. 2003; Preslan MW, et al., 1998; Kempen JH, et al., 2004; Negrel AD, et al., 2000; Wedner SH, et al., 2002;) with sex (Villarreal GM, et al., 2003; Zhao J, et al., 2000; Gopal PP, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; 9. Natdoo KS, et al., 2003; Zao J, et al., 2002; Weale RA. 2003; Wedner SH, et al., 2002;), age (Zhao J, et al., 2000; Gopal PP, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Natdoo KS, et al., 2003; Zao J, et al., 2002; Weale RA. 2003;), the amount of work to close (Weale RA. 2003; Wedner SH, et al., 2002), education of the child and parents' education level. (Goh PP, et al., 2005; Wedner SH, et al., 2002)

Various studies incriminate myopia as the most common refractive error in school-age children (Villarreal GM, et al., 2003; Zhao J, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; Natdoo KS, et al., 2003; Zao J, et al., 2002; Wedner SH, et al., 2002) and

also indicate to urban areas as having a higher prevalence of myopia (Villarreal GM, et al., 2003; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Zao J, et al., 2002; Weale RA. 2003). In contrast to hyperopia and astigmatism, myopia causes a blurred distance view. Amblyopia, caused by untreated refractive pathology, is one of the most common defects of view diagnosed in children, and also a key target of screening programs. This has a strong impact on the socioeconomic and educational level (Negrel AD, et al., 2000; Aaron M. Et al., 2006).

Studies that have examined different populations showed that only a third or less of the children with refractive errors are wearing correction optics, meaning glasses. (Villarreal GM, et al., 2003; Zhao J, et al., 2000; Gopal PP, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Preslan MW, et al., 1998; Wedner SH, et al., 2002). However, the above mentioned studies indicate that they may not be possible factors for this low compliance. So we decided to set it in this paper.

## MATERIALS AND METHODS

This study is part of a larger project. Parts of it have already been communicated in the form of scientific papers in various journals.

This study was conducted during February-March 2013. We obtained verbal consent of the director of the teachers and parents of children who would be placed in the study. Research protocol complies with the Declaration of Helsinki on research involving human beings.

We reviewed 315 children with ages between 6 and 11 years enrolled in primary school from 5 schools from Arad (urban) to which we add children in 5 schools from the Commune of Arad County (rural). These students represent the patients who after the consultation from September 2011 - March 2012 presented refractive errors. Into those 315 are included both those who knew about the problem of view as well as the new discovered ones of our study from September 2011 - March 2012. All 315 students received clear indication of treatment by corrective optics. This indication was communicated through teachers to the parents.

We did not find children who refused the examination nor had I met unwilling parents.

In the study conducted between September 2011 and March 2012 the distance view of the students was tested using Snellen table or table illiterate "E". Visual acuity was tested at 6m in good lighting conditions during the day. If visual acuity without correction was less than or equal to 0.8 regardless of the eye (or only in one eye or in both), the subject was considered as having visual disorders.

The test coverage - discoverage was conducted to confirm or deny the presence of trophi or phori. Therefore, if the eye moved to remove occlusion muscle examined confirmed the presence of phori. If the deviation angle does not change the test coverage - discoverage is considered that the patient has a Trophi (more than 5 degrees / 10 prism diopters). Eye movements were tested in all 6 cardinal directions to exclude paralytic or restrictive strabismus. Anterior segment was examined with a flashlight to detect cataract ophthalmology, anophthalmia, microphthalmia, megalocornea or previous ocular surgery. Objective refraction was measured with a autorefractometer Potek 5000, under the previous cycloplegic subjects, obtained with the instillation of cyclopentolate 1% solution applied at 15 minute intervals for an hour. This procedure was applied to all children regardless of visual acuity found.

Statistical analysis was obtained with the program Epi Info 7.

It was considered that the condition of emmetropia corresponds to a spherical equivalent between -1.00 and +1.00. It is considered objective refraction myopia greater or equal to -1.00 SD at one or both eyes. Hyperopia was defined as objective refraction greater or equal to +1.50 DS in one or both eyes. Astigmatism was considered to values greater than or equal to 1.00 D. The results are presented in tables.

This study involves a new visit to the schools where children were tested. Precise date of this control was not communicated to obtain the most accurate data on child compliance. The examiners established by direct inspection whether or not students wear indicated optical correction. Children who didn't wore glasses were asked if he had them at school and to indicate one of 10 reasons for non-compliance.

Urban or rural areas, gender, age, education level and financial data, were obtained from the previous study.

## RESULTS AND DICUSSIONS

During the period September 2011 - March 2012 out of the 612 students examined we found 185 in rural areas students who had refractive errors (myopia 31, 65 hyperopia, astigmatism 89). Of these only 31 students didn't wore glasses (8 for myopia, hyperopia 23 for and none for astigmatism). We found 83 students with the refractive errors who did not know their pathology (12 with the myopia, 23 and 48 with the hyperopia with astigmatism) and 71 who knew of vision problems but did not worn correction (11 with the myopia, 19 and 41 hyperopia with astigmatism ). (Table 1.A)

From 519 students examined we found 130 students in urban areas who had refractive errors (17 myopia, 43 hyperopia, astigmatism 70). Of whom only 47 students wore glasses (8 for myopia, hyperopia and 28 to 11 for astigmatism). We found 50 students with the refractive errors who did not know about their pathology (5 with the myopia, hyperopia and 27 with the 18 with astigmatism) and 33 who knew but did not wear eyesight correction (4 with myopia, 14 and 15 with the hyperopia astigmatism). (Table 1.B)

Therefore, if we refer to the two areas together, during September 2011 - March 2012 of a total of 1121 students examined we found 315 students who had refractive errors (nearsightedness 48, 108 hyperopia, astigmatism 159). Among these only 78 students wore glasses (16 for myopia, hyperopia and 28 to 34 for astigmatism). We found 133 students with refractive errors who did not know about their pathology (17 with the myopia, hyperopia and 75 with the 41 with astigmatism) and 104 students who knew of vision problems but didn't wear any correction (15 with the myopia, hyperopia 33 and 56 with the astigmatism) (Table 1.C and chart 1).

In the study conducted in February-March 2013 of the 185 students diagnosed with refractive errors 93 wore spectacles in rural areas (27 cases of myopia, hyperopia 41 cases and 25 cases of astigmatism). In the case newly diagnosed in September 2011 - March 2012, 41 students are now wearing optical correction (11 cases of myopia, hyperopia 10 cases and 20 cases of astigmatism). For those who did not wear optical correction with refractive pathology although they knew that were suffering of it in September 2011 - March 2012, 21 students are now wearing optical correction (8 cases of myopia, hyperopia 8 cases and 5 cases of astigmatism - Table 2.A).

In the study conducted in February-March 2013 of 130 students diagnosed with refractive errors 111 wore spectacles in urban areas (16 cases of myopia, hyperopia 38 cases and 57 cases of astigmatism).

In the case newly diagnosed in September 2011 - March 2012, 43 students are now wearing optical correction (3 cases of myopia, hyperopia 21 cases and 18 cases of astigmatism).

TABLE 1.

<b>A. Rural Env.</b>								
	No. cases	(%)	Myopia	Correction for M	Hyperopia	Correction for H	Astigmatism	Correction for A
No of pupils	612	100						
Total refractive errors	185 (31)	30.23	31	8	65	23	89	0
Newly discovered refractive errors	83	13.56	12	0	23	0	48	0
Known and uncorrected refractive errors	71	11.6	11	0	19	0	41	0
<b>B. Urban Env.</b>								
	No. cases	(%)	Myopia		Hyperopia		Astigmatism	
No of pupils	509	100						
Total refractive errors	130 (47)	25.54	17	8	43	11	70	28
Newly discovered refractive errors	50	9.82	5	0	18	0	27	0
known and uncorrected refractive errors	33	6.48	4	0	14	0	15	0
<b>C. Rural and Urban env.</b>								
	No. cases	(%)	Myopia		Hyperopia		Astigmatism	
No of pupils	1121	100						
Total refractive errors	315 (78)	30.23	48	16	108	34	159	28
Newly discovered refractive errors	133	13.56	17		41		75	
known and uncorrected refractive errors	104	11.6	15		33		56	

For those who did not wear optical correction and with refractive pathology although they knew that they were suffering in September 2011 - March 2012, 21 students are now wearing optical correction (4 cases of myopia, hyperopia and 6 cases of 11 cases of astigmatism). (Table 2.B)

Therefore, if we refer to the two areas together, rural and urban, in the study carried out in February-March 2013, of the 315, 204 students diagnosed with refractive errors and wore spectacles (43 cases of myopia, hyperopia 79 cases and 82 cases of

astigmatism). In the cases newly diagnosed in September 2011 - March 2012, 84 students are now wearing optical correction (15 cases of myopia, hyperopia 31 cases and 38 cases of astigmatism). For those who did not wear optical correction with the refractive pathology although they knew that they were suffering, in September 2011 - March 2012, 42 students are now wearing optical correction (12 cases of myopia, hyperopia and 14 cases of 16 cases of astigmatism). (Table 2.C)

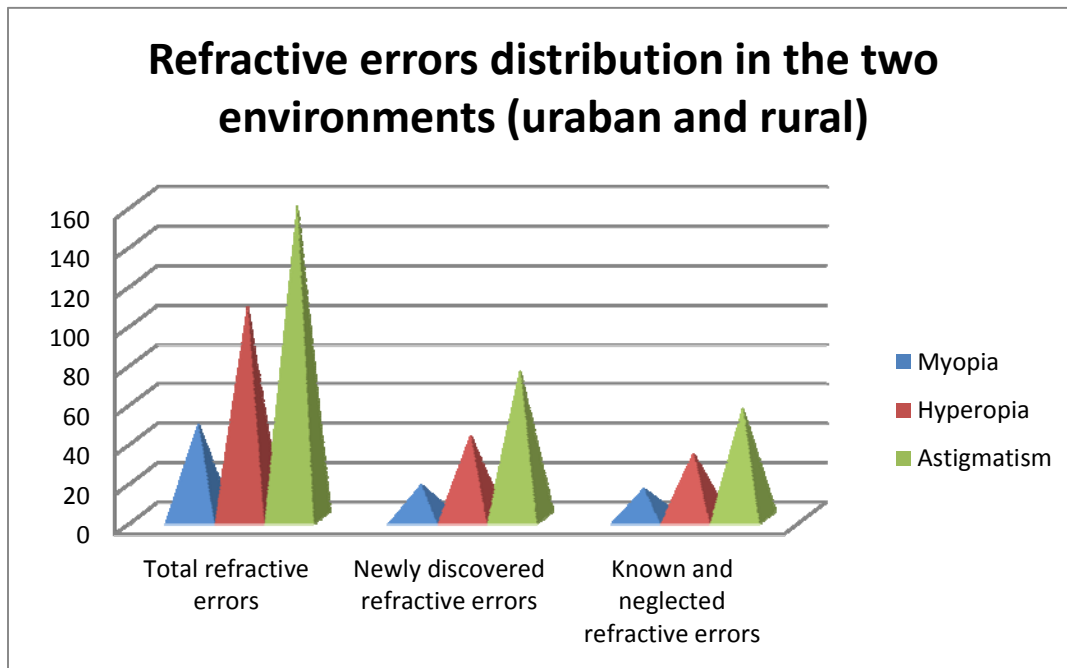


Chart 1

TABLE 2.

		A. Rural Environment							
	No. cases	(%)	Myopia (%)	Hyperopia (%)	Astigmatism (%)				
Total refractive errors	185	100	31	65	89				
Spectacles Corection in Stage I (*)	31	16.76	8	23	0				
Spectacles Corection in Stage II (**)	93	50.27	27	41	25				
Spectacles Corection from NDRE(***)	41	22.16	11	10	20				
spectacles Corection from KURE (****)	21	11.35	8	8	5				
		B. Urban Environment							
	No. cases	(%)	Myopia (%)	Hyperopia (%)	Astigmatism (%)				
Total refractive errors	130	100	17	43	70				
Spectacles Corection in Stage I (*)	47	36.15	8	11	28				
Spectacles Corection in Stage II (**)	111	85.38	16	38	57				
Spectacles Corection from NDRE(***)	43	33.08	4	21	18				
spectacles Corection from KURE (****)	21	16.15	4	6	11				
		C. Rural and Urban Environment							
	No. cases	(%)	Myopia (%)	Hyperopia (%)	Astigmatism (%)				
Total refractive errors	315	100	48	108	159				
Spectacles Corection in Stage I (*)	78	24.76	16	34	28				
Spectacles Corection in Stage II (**)	204	64.76	43	79	82				
Spectacles Corection from NDRE(***)	84	26.67	15	31	38				
spectacles Corection from KURE (****)	42	13.33	12	14	16				

After questioning students about the causes of poor compliance we have obtained the following results: 41 students could not or did not want to show any reason, 31 said they did not feel the need for glasses or one or both parents do not think glasses are required, 16 are

bothered by the appearance of glasses produced, 15 have forgotten glasses at home, 5 were lost or broken glasses and 3 said that wearing optical correction causes them headaches. (TABLE 3 and Chart 2)

Students who wear corrective optics	204
Students not wearing optical correction	111
- Forgot glasses at home	15
- Do not feel the need of glasses/parents don't agree to the use of correction	31
- Headache from glasses	3
- Aesthetic reasons	16
- Lost or broken glasses	5
- Other reasons/ no reason	41

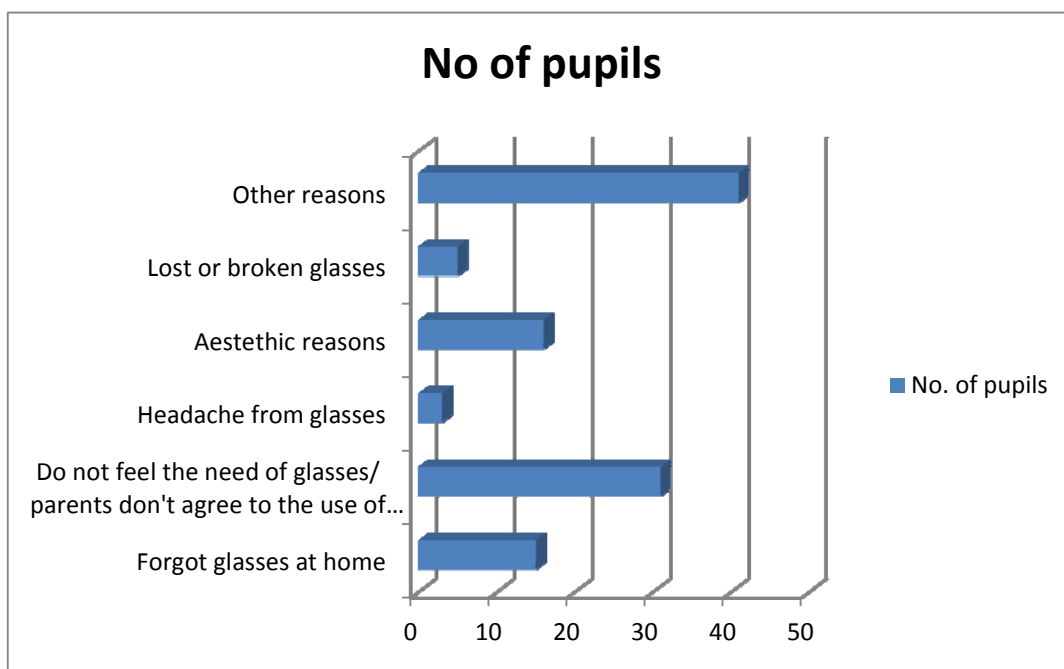


Chart 2

During the period September 2011 - March 2012, 78 students wore optical correction. Compared to the total number of students requiring treatment they represent 24%. At one year, meaning in March 2013 this percentage reached 65%. Our study intervention had a significant impact, increasing the number of students who wear corrective optics with 161%.

Aaron M. Castanon Holguin in a 2006 study identified two risk factors which lower compliance to the use of glasses, older age and urban areas origin. Small number of students identified as using the optical correction of Aaron M study, 13% is in the agreement with other similar reports. This low rate of compliance obtained is mainly due to the different methodology applied study. Results from the study of Aaron M were based on actual inspection methods used similar with the ones used in the present study. Other studies have

used methods that are dependent on a self - report. (Aaron M. Et al., 2006)

Another finding with important implications is that a very low compliance was found among students who experienced mild refractive errors. (Aaron M. Et al., 2006) is explained by the fact that small refractive errors can be compensated by accommodation especially children.

Aaron M has identified two main risk factors which are due to noncompliant students from correcting optics: age and provenance from urban students. (Aaron M. Et al., 2006) The prevalence of myopia among school-age students increases with age (Zhao J, et al., 2000; Gopal PP, et al., 2000; Maul E, et al., 2000; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Natdoo KS, et al., 2003; Weale RA. 2003; Kempen JH, et al., 2004; Negrel AD, et al., 2000; Wedner SH, et al.,

2002) Numerous studies have shown a higher prevalence of myopia in children in urban areas than in rural areas (Villarreal GM, et al., 2003; Goh PP, et al., 2005; Dandona R, et al., 2002; Gurby GV, et al., 2002; Zeng J, et al., 2004; Zao J, et al., 2002; Weale RA. 2003). An interesting perspective that emerges out of this is that just those students who can benefit from the corrective optics, are those who are at risk for non-compliance. (Aaron M. Et al., 2006)

Despite the significant increase achieved remain, 111 students who are not compliant to treatment. The lowest compliance was recorded in the rural area children with astigmatism. We identified different behind reasons of poor compliance. It remains to identify new ways to influence the behavior of these students in order to increase compliance with treatment.

The study has some limitations, among which are the following: we addressed to students only, meaning children who attend school. There were not examined those who have left school. Several studies have concluded that the prevalence of myopia is higher for students due to the longer short distance work (writing, reading).

## CONCLUSIONS

Objective screening methods to identify children suffering from refractive ophthalmic pathology. At the same time, point out the need for wearing optical correction. These actions significantly improve students' compliance to treatment.

Most students whose compliance to treatment is low, cannot identify the exact reason for this. Small refractive errors, which cause significant discomfort, are an important cause of low compliance to treatment.

Two adjacent components (astigmatism and rural areas) are risk factors for very low compliance.

Conversely, the best compliance we registered it myopic students from urban areas schools.

## APPENDIX

Spectacles Correction in Stage I (\*) – examined between September 2011- March 2012

Spectacles Correction in Stage II (\*\*) – examined between

Spectacles Correction from NDRE (\*\*\*) - Spectacles Correction from Newly Discovered Refractive Errors

Spectacles Correction from KURE (\*\*\*\*) - Spectacles Correction from Known and Uncorrected Refractive Errors

## ACKNOWLEDGMENTS

Doctoral research funded within the international project POSDRU/CPP107/DMI 1.5/S/77082 entitled "Doctoral scholarships and bio eco-economic complex training for food and feed safety and security of human ecosystems".

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