

Can patients with visual impairment follow a normal school?

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Abstract

Aim. To highlight the needs for socio-professional orientation of patients with visual impairment.

Material and methods. Prospective observational study on 69 patients (47 boys and 22 girls), with a mean age of $15,99 \pm 3,4235$ years, evaluated in the Ophthalmology Clinic of "Sf. Spiridon" Hospital Iași, in order to obtain a medical certificate. Clinical parameters: slit lamp examination, fundoscopy, visual acuity, intraocular pressure, orthoptic exam, ocular ultrasound, or corneal pachymetry (in selected cases). A questionnaire for the age group of 12-18 years was applied. Data were statistically analyzed by using the Student's t-test.

Results. Sixteen patients had ocular prosthesis or visual acuity 0 in one eye and 31 patients had a low vision. Patient's diagnosis: anterior segment diseases (23,18%), posterior segment diseases (52,17%), other diagnoses (24,63%). The pathology was congenital in 60,86% of the cases. 13,04% of the patients (3 school children and 6 students) asked for the integration into normal school/ university. Frequent answers: lack of special means of assistance in schools/ universities, need for additional schooling, people's reluctance which led to situations of ridicule, dependence on others to perform daily activities, need for professional help.

Conclusions. Children with eye deficiencies can be scholarized in normal an educational system, according to the level of intelligence. Adolescents with eye disorders may attend University courses if proper aids are provided. Socio-professional orientation should be performed as early as possible to increase the quality of life in sighted patients. Aids for low-vision patients are insufficiently used in Romania.

Keywords: visual impairment, children, normal school, quality of life

Introduction

According to the International Classification of Diseases, there are four levels of visual function: normal vision, moderate visual impairment, severe visual impairment, and blindness.

Combined with severe visual impairment, moderate visual impairment is grouped under the term "low vision": low vision taken together with blindness representing all visual impairment [1]. The classification of low vision outnumbers that of blindness by 10 to 1 in Europe [2]. WHO

estimated that in 2010 there were 285 million visually impaired people, of whom 39 million were blind [3]. Also, it was estimated that 19 million children are visually impaired. Of these, 12 million children are visually impaired due to refractive errors [4].

A large number of people with visual impairment was reported even in some developed countries. In Finland, out of a population of 5,4 million in 2012, roughly 80,000 were considered visually-handicapped (according to the Finnish National Institute of Health & Welfare), with approximately 50,000 visually impaired people in the age group of over 65 alone [5]. A National Health and Nutrition Examination Survey (NHANES) study has found that 93,6% of the individuals in USA, aged 12 years or older have a good presenting visual acuity (20/40 or better in the better-seeing eye). Of the remaining, 6,4% (approximately 14 million) of the persons with visual impairment, 83% (more than 11 million) could achieve good visual acuity after a refractive correction [6].

Material and Methods

The study was a prospective observational one, on 69 patients, selected from 135 patients who required medical certificates between January 2013 and March 2015 for the Medical Expertise Commission or for registering in normal schools, in the Department of Ophthalmology of "Sf. Spiridon" Hospital in Iași. Selected patients had a mean age of $15,99 \pm 3,4235$ years (limits 12-27 years). From these cases, 12 teenagers completed a questionnaire regarding the difficulties encountered during schooling. We were particularly interested in the professional integration of these patients. In the selected cases, the majority of patients (68,12%) were male. 63,76% were from rural areas, which highlighted the late addressability of patients for a specialized examination.

In all selected cases, the following investigations were made: visual acuity, objective refraction, examination of anterior segment of the eye, intraocular pressure, and funduscopy. The orthoptic exam, ocular echography, corneal pachymetry, and ocular axial length were determined according to the need and with the patient's collaboration. Data were statistically

analyzed by using the Student's t-test (statistically significant at $p \leq 0,05$).

Results

The mean visual acuity (VA) of the right eye (RE) was $0,33 \pm 0,38$ (limits between uncertain light perception - 0,00001 and 1,2). For the left eye (LE), the mean VA was $0,21 \pm 0,29$, with the same limits as the RE. The p-value was $< 0,019936$ (statistically significant). Approximately 64,70% of the total patients had a visual impairment in the RE and 77,94% in the LE. The visual acuity was 0 in about 9% of the patients in the RE and of 13% in the LE (Table 1). From the 138 eyes (69 selected patients), 66 eyes had low-vision (47,83%), 5 eyes (3,62%) had ocular prosthesis for anophthalmia (visual acuity 0), 11 eyes (7,97%) were blind, 38 eyes had normal and near normal vision and one patient had undetermined visual impairment ($p=0,339509$). Most patients fell into low vision, with a severe decrease of vision and complete blindness. Bilateral visual impairment was present in 57,97% of the cases, unilateral visual impairment in 26,08% and 14,49% had no visual impairment (with 1,44% undetermined visual impairment) (Table 1).

Table 1. Stages of visual impairment

LOW VISION	MODERATE DECREASE	OD: 13,23% OS: 17,64%
	SEVERE DECREASE	OD: 23,52% OS: 22,05%
BLIND	PROFOUND DECREASE	OD: 7,35% OS: 10,29%
	NEARLY BLIND	OD: 0% OS: 1,47%
	COMPLETELY BLIND	OD: 20,58% OS: 26,47%

Regarding the optical correction, it was necessary in 44,92% of the cases for the RE and in 47,82% of cases for the LE. The refractive errors (in spherical equivalent) for the RE had limits between -16 diopters (D) and +14,00 D, with a mean value of $-1,77 \pm 5,592$ D (Fig. 1). In the LE, the refractive error (in spherical equivalent) ranged between -18,5 D and +13 D, with a mean

value of $-1,96 \pm 6,166$ D (Fig. 2).

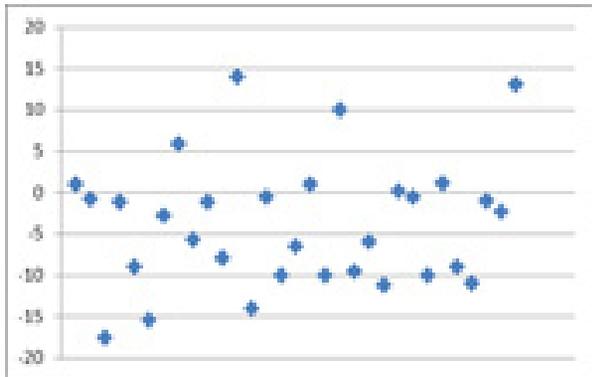


Fig. 1 Refractive errors in RE

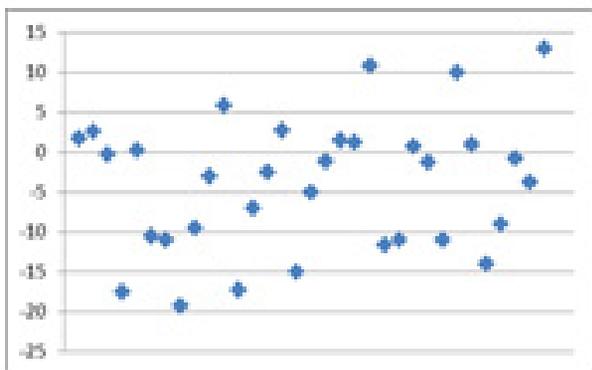


Fig. 2 Refractive errors in LE

Out of the 69 patients, 40,57% had changes of the posterior pole in the RE and 60,86% had a change of the anterior pole at the same eye. The LE had changes in 37,68% of the posterior pole and in 60,86% in the anterior one. Fundoscopy could not be performed in 13,04% of the cases in the RE and in 14,04% in the LE; one patient was not able to undergo the examination because of the associated pathologies and 7,24% of the cases had ocular prosthesis in the LE.

The mean intraocular pressure (IOP) was $13,44 \pm 3,53372$ mm Hg (in 39,13% cases) in the RE and $14,09 \pm 3,62959$ mm Hg in the LE (in 33,33% of the cases). 4,34% of the cases had ocular hypotony in the RE and 5,79% in the LE. At the orthoptic exam, 34,78% of the patients had strabismus, ocular motility disorders and binocular vision changes. In 20,28% of the cases ocular modifications at the ocular echography in A and B mode were presented. Corneal pachymetry

was performed in 5,79% of the cases, with a mean value of 600,5 microns in the RE and 593,5 microns in the LE. The mean value of ocular axial length was of 26,08 in the RE and of 25,95 in the LE, for 5,79% of the cases.

The main causes for the decreased visual acuity found in this study were the following: refractive or strabismic amblyopia (16 eyes – 11,59%), congenital diseases (81 eyes – 58,69%), acquired diseases (27 eyes – 19,56%) and ocular trauma (6 eyes – 4,34%) (Fig. 3).

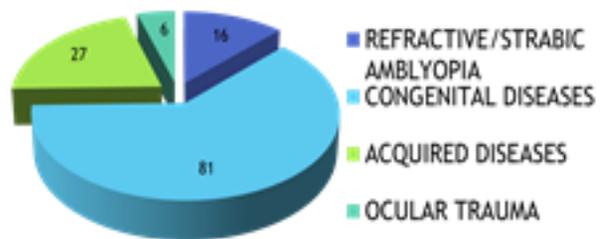


Fig. 3 Causes of decreased visual acuity

The main causes for the decrease in the visual acuity regarding refractive/ strabismic amblyopia are astigmatism (6,15%), esotropia (3,07%) and hyperopia (2,17%). Among the congenital diseases, the most important are degenerative myopia (18,11%), operated congenital cataract (5,79%), Stargardt disease (5,79%), congenital optic nerve anomaly (4,34%) and congenital nystagmus (4,34%). The most common acquired diseases are retinopathy of prematurity (6,52%) and ocular toxoplasmosis sequelae (5,07%). From our selected patients (69 cases), only 21 cases (30,43%) requested the integration in normal school or university (Fig. 4).

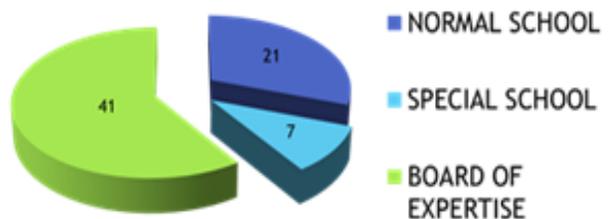


Fig. 4 Options for school education

From the 69 selected patients (52 had an age under 18 years), 12 cases (17,39%) completed our questionnaire. Of these, 42%

of the patients followed a normal school, 25% followed a normal school because parents refused the special school for visually impaired, 25% followed a special educational system since the 1st grade and 8% since the 9th grade. All those who followed a special school were referred to it as it was considered that they could not keep up with their colleagues. It was also revealed that teachers were not trained and the school did not have the means to educate children with visual impairment. The mean VA for patients in a normal school was $0,48 \pm 0,50399$ in the RE and $0,07 \pm 0,06653$ in the LE (of whom 3 patients had a visual acuity of 0), with a p-value of 0,431044. Children in the special school had a mean visual acuity of $0,05 \pm 0,05249$ in the RE (1 case with a visual acuity of 0) and of $0,06 \pm 0,09697$ in the LE ($p=0,018593$). Four children following a normal school had unilateral visual impairment and four had bilateral visual impairment. All students who attended the special school had bilateral visual impairment. In all cases, students following a special school would have liked to study at a school with a normal profile. Educational achievement and the desire to continue their education were lower in patients following a normal school. This raised the question whether school results and the desire to continue studies were influenced by the absence of the means of assistance in the educational institutions (Table 2).

Table 2. Patients' school education

	Normal school	Special school
Medium visual acuity	RE: $0,48 \pm 0,50399$ LE: $0,07 \pm 0,06653$, va=0 in 3 cases	RE: $0,05 \pm 0,05249$; va=0 in 1 case LE: $0,06 \pm 0,09697$
Help from school	All cases (now)	All cases
School results	>6	>8
Continue studies	87,5%	100%
Difficulties	75%	100%
Desire to follow a normal school	-	100%

Almost all the students had a difficulty in both the social and the educational terms. Half of the children following a normal school could move without help (33,33%) and half needed it (33,33%). For students following a special school 1/ 4 (8,33%) did not experience this issue, the rest needing help in this direction (25%). Of the

eight children who attended the normal school, two (16,66%) encountered social difficulties from colleagues and from the 4 following a special school, one child (8,33%) mentioned the same difficulties.

Social difficulties mentioned by 12 students who completed the questionnaires were the following: they felt different because they wore glasses or other optical devices; they felt embarrassed because they bumped into or dropped objects; they did not feel included because they could not participate in all the social activities; dependence on others to perform daily activities; people's reluctance which led to situations of ridicule; the absence of permanent contact with the community; the need for professional help (psychologist). From the professional point of view, the following issues were reported: impossibility to look at the video projector; difficulty in discerning the writing on boards; the need for additional schooling; learning through other methods (course registration, learning with peers who read the course to them); lack of methods which could be helpful (in normal schools) ex. zoom video devices, telescopic and hypercorrection systems, zoom PC monitor systems, Braille, etc.

Discussion

According to WHO, in 2004, the prevalence of low vision in Europe (visual acuity between $<6/18$ and $\geq 3/60$), was of 27,9 millions and for blindness (with visual acuity $<3/60$), 2,3 million. Based on the average global severity weight for both sexes and all ages, and in accordance with the Global Burden of Disease: 2004 update, low vision disability was listed in class III (severity weight of 0,12-0,24) and blindness in class VI (severity weight of 0,50-0,70) [7].

The leading causes of decrease in the visual acuity were congenital diseases (58,69%) followed by acquired diseases (19,56%). The main causes for visual impairment were acquired diseases (55,3% for low vision and 50,2% for blind) and congenital diseases (14,9% for low vision and 30,9% for blind) [8]. In our study, the main causes of visual decreased acuity were: refractive or strabismic amblyopia (16 eyes – 11,59%), congenital diseases (81 eyes – 58,69%), acquired diseases (27 eyes – 19,56%) and ocular

trauma (6 eyes – 4,34%).

The ability to perform activities is important in an individual's life, to the extent that those activities are necessary or desirable to the individual [9]. The presence of a visual impairment can affect the ability to read, watch television, drive, walk, learn, perform simple activities of daily living, and, in many cases, to maintain independence in a safe manner [10]. There are a number of studies that follow the patient's wellbeing and state of mind. Visually impaired people were more likely to report difficulties in performing activities of daily living, rated their health as poor, had low levels of physical activity, and lived in areas of higher deprivation [11]. For mobility tasks, most persons were not disabled until they had a significant visual acuity loss (logMAR visual acuity $>1,0$ or $<20/200$) and for heavily visually intensive tasks, like reading, visual acuity worse than $0,2$ logMAR ($20/30$) was disabling [12]. The Blue Mountains Eye Study showed that unilateral non-correctable impairment affects "role limitation due to physical problems" (15% lower than people with no visual impairment), "social functioning" (7% lower), "role limitation due to emotional problems" (13% lower), and in the mental component score, with a greater effect on the mental domain than the physical domain [13].

Students with low vision may have difficulties with reading and writing activities, even when they use optical aids (that magnify the image) and non-optical resources (material adaptation and changes in the environment) [14]. Those students can benefit from the combined use of these resources with information technology, such as screen enlargers (systems that magnify the characters on a computer) and speech synthesizers (specific adaptations with voice output, which convert screen content to speech) [15]. In addition, in the modern learning environment, students are expected to download course materials from dedicated course web sites, access course-management systems (such as WebCT and Blackboard), make presentations using PowerPoint. Students need to be proactive in managing their own learning experiences [16]. Almost all the students from our study had difficulties both in social and educational terms. Half of the children following a normal school can move without help (33,33%) and half need help (33,33%). Our study highlighted the lack of such

means in schools from Romania, thus making it harder or impossible for children with visual impairment to properly learn in normal schools. In order to support these patients, professionals and educators need to be rehabilitated in order to identify and assess which training they should provide to students regarding the use of computer technologies and should fill any gaps, especially those identified by the students themselves [16].

Conclusions

The child with eye deficiency can be schooled in a normal educational system and not only in schools for the blind, according to the level of intelligence. Adolescents with eye disorders may attend university courses if proper aids are provided. Socio-professional orientation should be performed as early as possible to increase the quality of life in sighted patients. Aids for low-vision patients are insufficiently used in Romania.

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