Vision problems in children - a review

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ABSTRACT

Introduction: A vision problem is a condition that involves not only visual difficulty but can also include blindness.
Purpose: The purpose of this short review study is the early recognition of vision problems in children, proper treatment, as well as their prevention.
Materials and methods: The materials used in this study were recent articles on the subject mainly from the electronic database Medline, (HEAL-Link), with the following keywords: children, vision impairment, blindness, treatment, prevention.
Review: A high risk group of individuals that frequently presents ophthalmic severe lesions leading to blindness consists of children with prenatal and perinatal adverse effects.
Conclusions: Education provides the opportunity of co-existence between the blind and people who are able to see. This is the path to social inclusion of individuals with vision problems. Moreover, it is believed that these two groups will have more in common than differences between them through this experience.
Keywords: Vision problems, children

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INTRODUCTION

Vision problems are conditions that involve visual difficulties on the one hand and blindness on the other. More than 180 million people suffer from some form of visual impairment. However, the number of people suffering from blindness is not fully verified globally [1].

Frequently, an epidemiological study is impossible, because many blind people either live in remote areas or many families avoid declaring their child's disability. The number of people with blindness will grow proportionately as the average human lifespan increases [2].

Regarding Greece, research carried out in all elementary schools recorded that a rate of 0.22% of pupils aged 5-12 years had partial vision in both eyes. Nevertheless, later research carried out in 1997 stated that 9% of people aged up to 20 years old have decreased vision, 14% and 69% at the age of 21-64 and 65-84 years old, respectively [1].

Visual impairments can be categorized in different ways.

According to the Greek legislation (Law No. 958/1979), "blind" entails any person whose visual acuity (VA) is lower than 5% of the normal visual acuity in the eye that sees better and with the best possible correction. Also, a person that although has satisfactory visual acuity his peripheral vision is limited to 10 degrees or less centrally is considered blind [2].

According to the World Health Organization (WHO), the term blind includes any person with visual acuity (VA) less than 1/20 in the better eye. Also, even if a person has satisfactory visual acuity, but his peripheral vision is limited to 10 degrees or less centrally, he is considered blind [3].

The World Health Organization concisely defined categories concerning people with serious vision impairments [3]:

- Category 1: Visual acuity between 3/10 and 1/10 (partially blind)
- Category 2: Visual acuity between 1/10 and 1/20 (partially blind)
- Category 3: Visual acuity between 1/20 and measuring the fingers from 1 meter or 1/30 (blind)
- Category 4: Visual acuity between finger measurement from 1 meter and perception of light (blind)
- Category 5: Visual acuity non perception of light (blind)

The purpose of this short review study is the early recognition of vision problems in children and its proper treatment.

Also, the difficulties faced in their daily life as well as the presentation of prevention methods are also examined

MATERIALS AND METHODS

The materials used in this study included recent articles on the subject that were extracted mainly from the electronic database Medline and the Hellenic academic libraries Link (HEAL-Link), with the following keywords: children, vision problems, blindness, treatment, prevention. A criterion for exclusion of articles was any language except for Greek and English. The included articles were on the cause of vision problems and blindness, children's difficulties with vision impairments, treatment, and prevention.

Cause of vision problems and blindness

A high risk group of individuals that frequently presents severe ophthalmic lesions leading to blindness consists of children with prenatal and perinatal adverse effects. Specifically [4]:

- Very small infants (their birth weight below 1,800 g)
- Twins
- Newborns who needed oxygen supply
- Prematurely born infants
- Infants with a physical or mental problem (Especially, severe eye damage is shown in 50% of infants with brain damage).

C*auses* of vision problems or even blindness can be divided into [5]:

- Hereditary causes, such as various family or degenerative phenomena, such as lack of pigment in the choroid or retina.
- Acquired causes, such as infectious diseases the mother had during pregnancy and injuries to the fetus' skull at birth. Infectious diseases during childhood, venereal diseases, malignancies, glaucoma, cerebral palsy, and serious injuries or poisonings are even implicated.

The *acquired causes* have a direct relationship with the immediate living and health status of inhabitants of different countries. A*cquired causes* of vision problems in *underdeveloped countries* include the following diseases:

- Trachoma - Trachoma is a form of chronic infection that occurs in rural areas of underdeveloped countries, causing severe vision impairments, and even blindness. Both the prevention and treatment of this disease is associated with eye care, proper pharmaceutical care and surgical interventions; unfortunately, this is almost impossible in those countries [6].
- Blindness due to malnutrition - Blindness due to malnutrition is caused due to poor nutrition and particularly due to lack of vitamin A from food products. Vitamin A is essential for the function of vision. It also helps the immune

system and helps the regeneration of photosensitive retinal cells, which are responsible for the refraction of light. The disease mainly affects young children from 6 months to 3 years old, causing serious damage to their eyesight. Prevention is based on vitamin A intake [7].

- Onchocerciacis - It is a parasitic disease leading to blindness because of a parasite that is transmitted from person to person by a fly bite. It infects 20-30 million people and is responsible for the blindness of several hundred thousand of them. Its treatment is related to water hygiene, proper treatment of the insect carrier, and the human host's hygiene (fly bites on the skin) [8].

A*cquired causes* of vision problems in *developed countries* include:

- Cataract - Cataract is the clouding or opacity of the lens of the eyes. It is caused by lesions of the protein of the lens increasing its thickness. The impairment cataract causes to vision is the interrelation of its position (central or peripheral) and its development [9]. An individuals' exposure to bright light causes more serious vision impairments (decreased vision). It appears in old age (60-70), where more time for maturation is needed, which is one of the main reasons for vision loss at those ages. Also, it might occur in kids 'at birth' where blindness follows with rapid development, which lasts a lifetime [10]. It is mainly treated through surgery. However, after the operation, many patients still face problems of decreased vision and blindness [11].
- Glaucoma - This disease is due to an increase in the inner pressure of the eye because of an inability of the watery fluid inside the eye to escape by the normal drainage system. It appears during old age, and nowadays, its treatment is considered effective [12].
- Eye injuries - Injuries are one of the most serious causes of blindness and other vision disabilities. They are equally common in both developed and underdeveloped countries. Most children's eye injuries occur during playing, while adults' eye injuries occur during working hours or due to traffic road accidents [13].

Children's difficulties with vision impairments

Loss of vision is a big social problem, which concerns not only blind children, but also their parents and their environment. There are direct and indirect effects caused by vision problems regarding social and emotional development of these children [14].

Direct effects include restrictions on the acquisition of certain cognitive schemes that require visual stimuli. *Indirect* effects come from the social environment and include a limited number of social interactions, which a child experiences because of negative social attitudes or limited knowledge about the nature of special needs [15].

The socialization of a child with impaired vision is even more affected by the social environment rather than his vision problem. Vision is necessary for everyday social skills, such as dressing and eating, behavioral development, as these skills are experienced in the specific social environment (context), through the family and school [16].

Children with vision problems pay more attention to, but also utilize, sound stimuli more, such as car noises, the texture of the voice, and the style of speech, sounds of the city, the working environment, and nature. There are also olfactory stimuli through touching things, people, materials, special devices, or accessories. Space perception, such as specification of dimensions and forms, and their visual cognition are major functions of cognitive perception through vision [17].

Children who suffer from complete blindness from a very early age express a delay in the perception of space; whereas individuals who either lost their eyesight in one of the two eyes gradually or their vision slowly degenerated in both eyes can manage space perception. The existence of similar experiences in the past is a prerequisite as long as the brain is ready to process the reflections being transferred, so that the person should have complete cognitive vision [18].

The communication difficulties that children and adolescents with vision problems have, as well as the behavior of sighted individuals, might adversely affect the normal development of their personality. When people with vision impairments share a common way of life with sighted people, they are forced to develop conciliatory modes of behavior. The existing circumstances of social data and low self-esteem can lead to particular ways of reacting, such as back-down, isolation, fear, unwillingness to cooperate, or even aggression, which is not usually expressed openly, because of the disability (blindness) and their toned for others [4,7].

Children with vision disorders also display an intense fear and embarrassment of their disability. These feelings follow them throughout their life. They often try to conceal their disability and the difficulties they present regarding their ability to adapt. Social integration groups are most important for children with vision problems. These groups usually consist of peer groups with or without any type of disabilities/disorders. Children with vision impairments may seize the chance to manage and deal with their insecurities. They could

also achieve certain standards and autonomy and succeed in their social inclusion [19].

Prevention of vision problems

Prevention is better than cure for every disease for medical and socio-economic reasons. Blindness is considered one of the most costly severe disabilities. Prevention of blindness is based on [20]

- The prevention of genetic disorders including:
  - genetic guidance and
  - amniocentesis
- Immunization, such as the rubella vaccine in young girls. It prevents congenital infection of the fetus by rubella during pregnancy.
- Proper care of the neonate during and after childbirth in obstetric/ gynecological centers with complete equipment. Frequent eye examinations of premature newborns play an important role in the early diagnosis and treatment of retrolental fibroplasia.
- Early diagnosis and treatment, such as surgery for congenital cataract, during the first trimester of life.
- Preventing accidents. In Greece, about 4% of blindness are caused by eye injuries. Parents are mainly responsible and the State for not preventing the manufacture and circulation of dangerous toys.

Treatment of vision problems

The treatment of children with impaired vision, and even blindness, includes training, education, and their vocational rehabilitation:

- Training - The training of a child with impaired vision starts from infancy, the moment the mother understands that the child does not observe or see. The age the blindness occurs plays an important role in the spiritual and mental development of the person. A child who had lost his eyesight before the age of 4 years old behaves as if he had never seen, but perhaps he has retained some memory of the concept of light that he once saw and that later leads him. The blind individual's set of memories, if any, along with the other senses, intelligence, and his surroundings govern the blind person's position among sighted people. The descriptions by sighted people, practicing touch and hearing, taste and smell create 'spiritual' pictures for the blind person [21]. The mother is the first person that will teach the child the first images, putting his hands on her face or in her hands, in various familiar objects, bed sheets, games, etc. The hearing and inquisitiveness sharpen when the mother describes everything and compares the unknown with the already known objects. Should parents overcome their own anxiety, they will make their child believe that he is a normal child. They ought to tell him the truth about his disability. They must also teach him that everything that cannot be seen by him is visible for the rest of sighed people. Indeed, he has to behave appropriately in the world of sighed people. The child must socialize with groups of sighted people to become independent [22].
- Education - Education starts at the age of five years old with the entry of the child into regular kindergarten, to be adapted to the world he is going to live in. This presupposes the child's hitherto education, to ensure the child is capable of moving, orienting himself, and taking care of himself. Later, he has to attend conventional school, while there is a special parallel education for blind people using the Braille system. A precise assessment of residual vision must precede this [23]. Therefore, the child could be completely assisted with visual aids as well as with electronics and television sets that make the most of even the minimum percentages of vision. Children with amblyopia had poor prognosis. The Braille system requires intelligence and touch. For every educational action, it is necessary to take into account the maturity of each student, the advantages and disadvantages of their uniqueness and personality. Compassion is the biggest obstacle to the progress of a child with impaired vision, and even blindness. Overprotectiveness is considered even more harmful than rejection [24].
- Vocational rehabilitation - Vocational guidance is done in specialized centers, depending on the degree of disability and in collaboration with psychologists and social workers. It depends closely on the mental abilities of the child with impaired vision and even blindness [7,16]. There is a law (N:1901/1951) for the protection and rehabilitation of the blind. The professions a blind can practice are those of voice-over, musician, typist, physiotherapist, weaver, etc. The World Health Organization reports that the main objectives of the Services addressed to persons with impaired vision are (a) its prevention and (b) the adaptation and assimilation of blind people into 'normal' society. In Sweden, acoustic signals are used at crossings, in newspapers, in cassettes, special lighting in workplace, special railway carriages on trains, and other aids that really make the blind equal members of society [16].

CONCLUSION

The right of every individual to education is inalienable. Education is a prerequisite for vocational rehabilitation and social inclusion. The way to social inclusion of people with vision disorders includes education that provides the opportunity for the blind to coexist with the sighted. It is believed that they will have more in common than differences through this experience.

Striving for the fulfillment of this objective requires the mobilization of individuals with vision impairments, health care professionals dealing with the specific field, as well as every citizen who believes that discrimination and social stigma must be overcome.

Conflicts of interest

The authors declare no conflicts of interest.

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