

PREVENTION OF CHILDREN'S VISION

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Abstract: With the support of the administrative management of Thracian University (TRU) and in collaboration with St. Petka Eye Clinic Varna, under the supervision of Prof Daniela Mitova, the first screening test - a modern method for early diagnosis of childhood vision - was conducted in October 2023 at the Medical College of TrU, Stara Zagora. It involved about 70 children together with their parents, aged between 2 and 16 years from kindergartens and schools in the city. The screening is carried out using the Plus Optix - Handheld Vision Screener. During the screening, the device measures the child's diopters, if any, as well as their interpupillary distance. Any child found to have an abnormality was issued a document for the parent to present to the ophthalmologist. In addition to the screening tests, a stereo test was performed in which special glasses were fitted to the child and he or she had to look into a picture. Eye movement relative to a light source was tracked to rule out the possibility of squinting. A complete eye examination for children with pathology includes: visual acuity testing, stereo test, color vision, anterior and posterior eye segment view. A trial frame with glasses is also used for a quick assessment of the given refractive problem. The obtained results were processed by the methods of variational statistics and visualized using Microsoft Office 2013. Through the screening tests, ocular pathology was detected in 25 out of 70 children examined. The highest relative proportion of children tested positive for hypermetropia (28%), followed by those with myopia (25%). In the remaining young patients examined, high astigmatism, a few cases of amblyopia and anisometropia were found in a small number of cases. There were single cases of esotropia, a type of strabismus in which the child curves one or both eyes inward, and exophoria, in which the eyes tend to deviate outward or one eye moves away from the other. Conjunctival nevi, frequent conjunctivitis, and a difference in pupil size, also known as anisocoria, have been found in some children. The study found that most of the parents were neither well aware nor informed about the proper vision care for their children. Awareness campaign was conducted to involve parents to work with doctors for timely vision prophylaxis to reduce the risk of developing refractive errors, prevention of multiple eye diseases and contributes to children not wearing glasses in future. The application of timely screening significantly reduces the incidence of amblyopia, which becomes indelible after a certain age. The role of parents in the control and health of children's eyes is decisive.

Keywords: Myopia, control, treatment, lenses, glasses.

1. INTRODUCTION

Sight is the most important function of our body to explore the environment. Through it, we obtain almost 95 percent of the information we need about the world around us and for our full development and growth. Vision prevention is one of the key factors preventing the development of serious eye diseases. According to the American Academy of Optometry, the first eye exam in children should be done at 6 months of age, then at 3 years of age and before the child enters school. For students, the recommendations are for an exam every 2 years. Children who have eye problems should be examined annually or according to the eye specialist's treatment plan. The earlier regular check-ups are started, the better the chance of preventing a problem related to the visual system. Worldwide, about 36 million people suffer from various abnormalities affecting vision, of which as many as 1.4 million are children. It has been found that between 30 and 45% of all adolescents need eyeglasses and nearly 5% of children suffer from a serious eye problem (Holden, et al., 2016). Among them, a variety of refractive errors are encountered, the most common of which are amblyopia, strabismus, myopia, hypermetropia, and astigmatism (Rudnicka, Kapetanakis, & Wathern, (2016)). All of these are characterized by blurred vision or inaccurate gaze focusing and can be both congenital and acquired (Kourkouta, Frantzana, Iliadis, Ouzounakis, & Monios, 2017).

- Myopia, also known as near-sightedness, is a defocusing of images and objects in the distance, in which light rays focus in front of the retina.
- Hypermetropia, also known as farsightedness, is characterized by clear vision of distant images, while those of close distance are blurred. Here, light rays focus behind the retina and this makes objects at a close distance blurry.

- Astigmatism, on the other hand, is a problem related to an irregular shape of the cornea, from which comes the ambiguity when focusing on a given image or object.
- Amblyopia is most commonly referred to as "lazy eye". In this disease, there is a delay in the development of the correct and full functionality of the eye. It is recommended to close the good eye in time so that the other one can start working properly.
- Strabismus is associated with a curvature of the eyes, which is best established during a consultation with an ophthalmologist.

There are also more serious diseases in childhood, but they are less numerous. The most common among them are congenital glaucoma, cataracts, tumors or various infections. With them, early detection and proper treatment are extremely important components. For this reason, even the smallest children should have full eye exams every year to reduce the risk of more serious vision problems. Among the most proposed methods for the treatment of visual anomalies is correction with glasses, contact lenses or surgery, and this is judged as a consequence of the nature of the problem, as well as its progress. The purpose of regular preventive eye examinations is related to children having a more complete development and paying more attention to one of our most important senses, namely sight.

2. MATERIALS AND METHODS

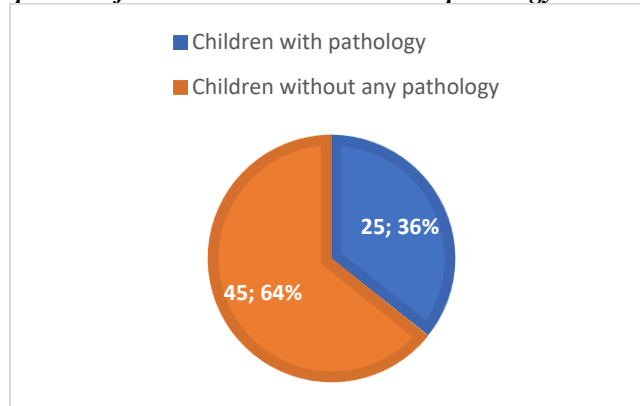
With the support of the administrative management of Thracian University (TRU) and the St. Petka Eye Clinic Varna, under the supervision of Assoc. Daniela Mitova, the first screening test was conducted in October 2023 at the Medical College of TrU, Stara Zagora. About 70 children together with their parents, aged between 2 and 16 years, from kindergartens and schools in the city participated in it.

The examinations were carried out under the supervision of a specialist, who explained the cases. Screening was performed using the Plus Optics – Handheld Vision Screener device. During the examination, were examined the child's diopters, if any, as well as his interpupillary distance were measured with the device. This type of examination provides basic data about the examined child, which will be used for the complete examination by the eye specialist. After each child in which an anomaly was found, a document was issued for the parent to present to an ophthalmologist. Along with the screening tests, a stereo test was also offered, where special glasses are placed on the child and he has to look at a given picture. Eye movement tracking relative to a light source was also performed to exclude the possibility of squint. All examinations were done using provided equipment by an eye specialist who consulted the parents and explained about their child's observed abnormality, if any was found. A complete eye exam in children with pathology includes a visual acuity test, stereo test, color vision, anterior and posterior eye segment examination, and a trial frame with glasses is used to quickly assess the given refractive problem. The obtained results were processed by the methods of variational statistics and visualized using the applications in Microsoft Office 2013.

3. RESULTS AND DISCUSSIONS

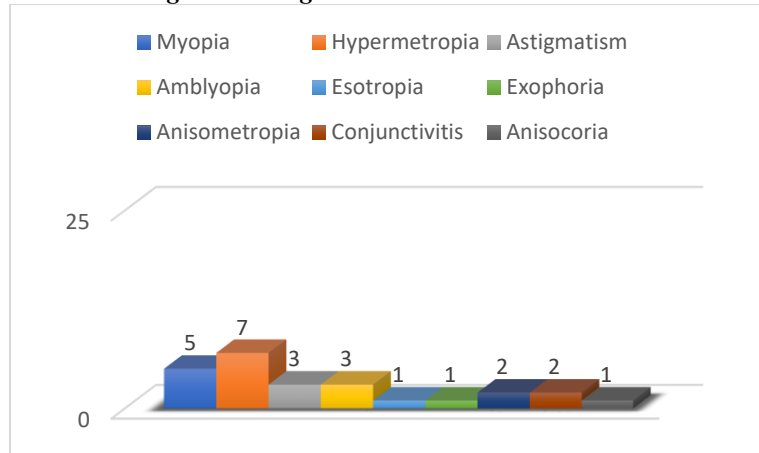
Screening tests done in the study revealed that 25 children out of 70 had ocular pathology (Figure 1). The highest relative proportion of children tested positive for hypermetropia (28%), followed by those with myopia found in 25% of children with pathology. The remaining young patients examined had results of high astigmatism, several cases of amblyopia (lazy eye) and anisometropia (diopter difference of the two eyes).

Fig.1. Proportion of children with an established pathology and those without



There were isolated cases of esotropia, a type of strabismus in which the child curves one or both eyes inward, and exophoria, in which the eyes tend to deviate outward or one eye moves away from the other. Some children were found to have conjunctival nevi, frequent conjunctivitis, and a difference in pupil size, which is also known as anisocoria (Fig. 2).

Fig.2. Pathological abnormalities established



During the course of the research, it was found that most of the parents were not well aware nor informed about the proper preventive eye care for their children. At the same time, a large number of symptoms have been known for a long time, which, if addressed, can identify the problem in time (Dandona & Dandona, 2006; Skarżyński & Piotrowska, 2012; Zhang, Jiang, & Qu, 2023). The most common symptoms in children are: bringing objects close to the eyes, head distortion or tilt, eye rubbing, sensitivity to light, and tearing and complaining of headaches. These symptoms should not be ignored by parents as they may be a serious ophthalmological problem. According to global standards, every child should be examined by an eye specialist at several stages in their childhood (Tariq et al, 2023)). The first examination should be at birth, the second after the age of 3 months, the third after the age of 3 years, the next before the start of first grade, and thereafter, eye examinations should be done annually (Bell, Rhodes, & Collier Kellar, 2013; Miller, Curtis-Tyler, Maden, Dahlmann-Noor, & Chudleigh, 2023). Examinations should be performed when the pupil is dilated so that the correct diagnosis and appropriate treatment can be established. Ophthalmological examination should be a mandatory part of regular medical care of every infant and adolescent child. A large proportion of visual disorders diagnosed at regular eye examinations in infancy could be successfully treated (Jonas et al, 2017; Miller et al, 2023).

The most pressing issue at present is excessive standing in front of video displays and spending almost all of one's free time indoors. This is one of the main reasons why the number of children with myopia has increased enormously in the last few years. It is important to prevent this problem in time so that every child's development can be improved. Parents play a major role here as they are the only ones who can control their children and their time spent in front of a phone or television (French, 2016). One of the most successful methods that can be applied in every child's daily life is the 20:20:20 rule - every 20 minutes in front of the screen, shift the gaze into the distance for another 20 seconds at a distance of 20 ft (He et al, 2015). Many research teams have concluded that even just increasing the amount of time children spend outdoors can limit the occurrence of myopia (Wu et al, 2018) and/or other visual pathologies (He et al, 2015; Tariq et al, 2023).

Wholesome nutrition and intake of group A vitamins contribute to healthy eyes in children. They protect the eyes from harmful ultraviolet rays and from night blindness. It is good for parents to know how to provide the necessary amount of vitamins to their children, either through a complete diet or additional nutritional supplements. This will stimulate the proper development of the eyes and help prevent various visual disorders.

5. CONCLUSIONS

Timely vision prevention contributes to children not wearing glasses in the future. Parents play a huge role in the control and health of children's eyes. Children's vision screening programs are extremely important for early diagnosis. Screening results can significantly reduce the incidence of amblyopia, which becomes invisible after a certain age. Timely preventive examination reduces the risk of developing refractive abnormalities and prevents many eye

diseases. Parents and doctors should be partners in building a healthy eye culture in children and work towards improving the future of children. They deserve a fulfilling childhood filled with visual clarity and an active lifestyle.

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