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MYOPIA IN PRE-SCHOOL CHILDREN AND MOBILE PHONES

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Abstract: The eye is the most important human sensation and it can captures almost 90% of informations from the surrounding area. The mechanism of the photo-camera's operation, for example, is made on the basis of the function of the eye, in that mode the reflected light of subjects is reflecting on the cornea, passes through the pupil, adjusts and then falls on the retina of the eye, so that is, it forms the image for the object. Myopia or short-sightedness is a refractive anomaly in which the rays of light break in front of the retina, causing short-sighted people to close their eyes, trying to get a sharp picture of the distant objects that they see blurry, and see them relatively well in the vicinity. As a cosmopolitan problem and according to the aetiological factors, myopia can occur at all ages and in both sexes, but more often in female. The total number of myopia patients is in continuously increasing over the last decade, as a result of intense and unmanaged use of mobile smart phones and computers. This is a descriptive epidemiological survey, with statistical processing and data analysis for several months in 2017, where 890 children aged 2.5 to 6 years were actively involved in the kindergartens in Shtip, Republic of Macedonia. Of these, 428 (48.09%) were male, and 462 (51.91%) were female. The screening was performed during the stay of children in kindergartens, using a 2WIN mobile binocular refractometer for detection of refractive errors, visual anomalies and measurement of the pupillary parameters. According to the results of our pilot-study, as well as the anamnestic data from the parents of children and kindergarten educators on the manner, about the duration and purpose of the use of mobile smart phones (screen size, mismatched picture light, viewing longer than 30 minutes/day due to obedience in nutrition, mutual competition, etc.), in 485 of the respondents or 54.78%, the results were closest/within the normal range. Deviations from the reference values were observed in 405 children, ie 45.23% of children, who were manifested as refractory disorders, or 280 with suspicion of development of strabismus, then 119 with initial myopia, and the others with visual astigmatism during the examination. Screening contributed to early detection, diagnosis and timely good treatment of uncorrected refractory anomalies, as well as determining the need and benefit of introducing a regular preschool screening program for visual disturbances. In view of the rapid development of technology and the possibilities it offers through mobile applications, in response to child's curiosity for the world, it was concluded that in the onset of myopia in pre-school children, there is also a very small amount of time spent on daily ultraviolet light in nature. The moderate and controlled use of mobile smart phones (just a few minutes in the day for children over five years) and well menaged the adaptation of smart phones' tools to the child's vision, contribute to the preservation and promotion of the overall health of children.
Keywords: smart phones, miopia, pre-school children

1. INTRODUCTION

More than half of the world's population in the next ten years will face vision problems, that is, short-sightedness, thanks to the increasingly frequent and prolonged inadequate use of blue (LED) light from televisions, computers, and smartphones. Since the arrival of smartphones on the market, late nineties to this day, the number of patients with myopia increased by 35%, and considering the trend for more frequent and improper use of them, the risk of visual disturbances increases proportionally, in the younger and the youngest population.[5] Numerous studies indicate that the unacceptable light from the small screens of smartphones, the short distance between the viewer and the device, the long-lasting work and/or the presence of the blue (non-natural ultraviolet) light, lead to increased eye pressure, muscle strain on the pupil, damage (retina) and a vague picture of objects at a distance of 1 meter.[1,6,7] Although myopia may be benign (also known as school) that occurs over 6 years of age, and a malignant and due to degenerative disorders (cornea, vitreous fluid, ocular nerve), in the last decade, myopia began in the pre-school age in children.[3,4,7] In order to prevent it, our research shows that uncontrolled the use of modern mobile phones by parents in the pre-schooled children has already shown results of a disturbed vision in children from 2.5 to 6 years of age.

2. METHODS AND RESULTS

In this descriptive and population-based cross-sectional study, which includes 890 children from four kindergartens in Stip - R. Macedonia, the screening program for visual disturbances in pre-school children was presented, and the children were aged between 2.5 and 6 years, enrolled in the spring period of year 2017. Of these, 428 (48.09%) are male, and 462 (51.91%) are females. Screening was performed with a 2WIN mobile binocular refractometer for detection of refractive errors, visual abnormalities, and measurement of pupillary parameters. The measurement principle is eccentric photo retinoscopy. Infrared rays (IR) are projected through the patient's puppies to the retina. Depending on the refractive error, the reflected light is broken and forms a characteristic light pattern (or image) within the pupil. [2] The 2WIN device measures the spherical and cylindrical power as well as the axis through the interpretation of the reflected light rays. Graph 1 shows the prevalence of visual disturbances among the respondents. The analysis of the results showed that 488 (54.83%) of children had results within the normal range. Deviation from the reference values of the parameters tested was observed in 402 (45.17%) of the respondents. The large number of deviations is due to the large number of individual results, where the only deviation is in the sixth parameter, that is, the angle of violation > 4.5^{O}. It is about 280 children or 31.46% of the respondents, who may have strabismus. Refractory errors were observed in a total of 119 (13.37%) children, anisometropia without refractory error (or with limit values) was observed in 3 (0.34%) children, while anicocera was not found in any of the children.

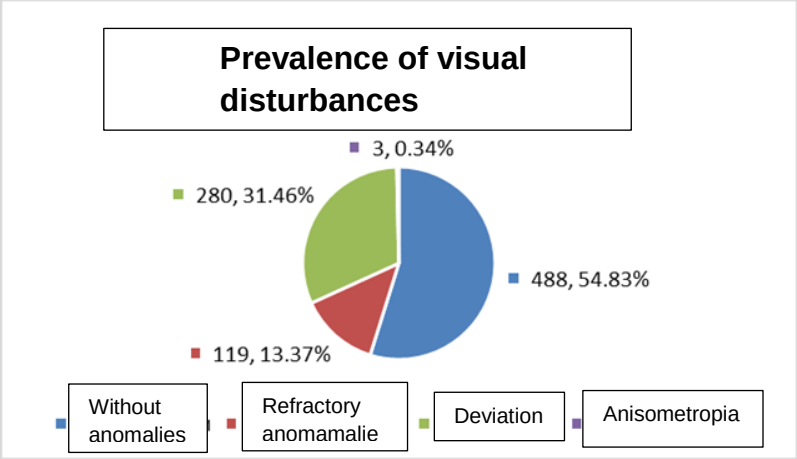

Chart 1. Prevalence in percents of visual disturbances

Although the prevalence of myopia in our study has among the low results, however, for its definitive determination and treatment, children are referred to an additional eye examination. From refractory anomalies, the prevalence of myopia, hyperopia, and astigmatism is 1.46% (13); 0.56% (5) and 12.13% (108) respectively (Chart 2).

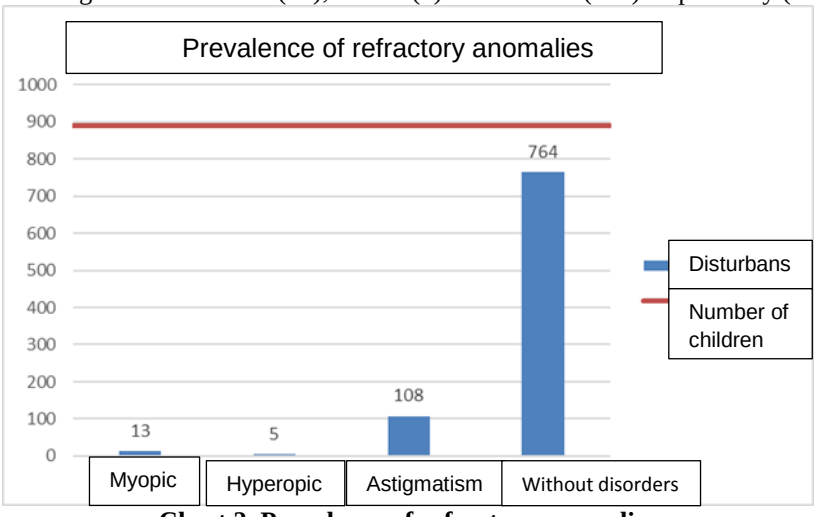

Chart 2. Prevalence of refractory anomalies

It can be noted that the most commonly observed refractory anomaly is astigmatism, present in 12.13% of respondents or 108 children. Myopia and hyperopia are significantly less represented by 13 (1.46%) and 5 (0.56%)

respondents respectively. In all children with symptoms and signs of myopia, as an anamnesis data from parents and educators in kindergartens, it has been found that they spend a long time at a very close distance from devices with unsuitable blue light (LED) rather than in the nature of the lounge light. The parents' most common excuses for allowing smartphones to pre-school children were for personal safety when going to kindergarten, video games with peers, food attention to the youngest. By an ophthalmologist and computer engineer, they were given a recommendation and advice on the prescribed distance from the device to the child (greater than 30 cm), the duration of the same (no longer than a 30 min/day) and the adjustment of the software tools of the mobile phones (the brightness of the screen) to the maturity of the vision organ in children of different ages, that is, absolutely not using mobile phones for children under the age of five. In addition to the already occurring myopia and depending on the degree, parents were recommended glasses for correction of visual disturbances when expectation of distance, learning, reading, as well as surgical (laser) intervention for rapidly progressing cases are expected, in order to improve the quality the health and the life of the children as a whole.

3. CONCLUSION

The results showed that a significant percentage of pre-school children have a refractory anomaly, with astigmatism visibly dominating over prevalence. Undetected or untreated, refractory anomalies could in the future have a negative impact on the child's educational progress, impair his learning potential, and hence his further career advancement. The earlier the diagnosis is made, the better the prognosis for vision and intervention. Children should not bear the burden of reduced visual acuity that affects everyday life and learning, since their early detection leads to timely and successful treatment, so that no child will be deprived of the excellent visual acuity of objects that perceive them. According to the results of the study, we recommend that a regular screening program for visual disturbances in preschool children be incorporated into the health program of the Ministry of Health, for the purpose of timely diagnosis and treatment of visual disorders.

4. PURPOSE

The purpose of this pilot study is to determine the prevalence of visual disturbances in children's pre-school age in kindergartens in Stip, identifying the same, early diagnosis and timed treatment of children with visual disorders, as well as determining the need and benefit of introducing a regular preschool a screening program for visual abnormals, provided to be in the Law on Health Care.

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