REVIEW

by

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Head of the Department of Ophthalmology and Visual Sciences,

Medical University - Varna,

appointed by Order of the Rector of MU-Varna No. R-109-279/24.06.2025

of the dissertation work of

Dr. Slavyana Dimitrova Malcheva-Marinova

on the topic "Ophthalmological Perspectives of Children's Eye Health",

submitted for awarding the educational and scientific degree "doctor"

in the professional field: Medicine

Scientific specialty: Ophthalmology

Scientific supervisor: Assoc. Prof. Dr. Yana Manolova Manolova, MD

Brief biographical data:

Dr. Slavyana Dimitrova Malcheva-Marinova was born in the town of Shumen. She completed her secondary education at GPCHE "N. Y. Vaptsarov", and in 2011 she obtained a master's degree in medicine at the Medical University "Prof. Dr. Paraskev Stoyanov" - Varna. In 2012 she began specialization at the Department of Ophthalmology and Vision Sciences at MU-Varna and in 2016 she obtained a specialty in "eye diseases". Since 2020 she has been a full-time doctoral student at the "Department of Ophthalmology and Vision Sciences", MU Varna. Her professional path has passed through various structures - both in Bulgaria and in Germany, including work at University Hospital "St. Marina" - Varna, DKC 1 - Shumen and a German practice in the city of Bottrop. She is currently practicing as an ophthalmologist at "Medical Center of Eye Diseases Dr. Marinov" - Shumen. Dr. Slavyana Dimitrova Malcheva-Marinova has successfully completed a series of specialized trainings in the field of ophthalmology, as follows: a course in ultrasound diagnostics, a course in intravitreal administration of medications, a course in modern methods for examining the retina through fluorescein angiography (FAG) and optical coherence tomography (OCT), as

well as a course in laser treatment of eye diseases. Dr. Marinova has three publications in national medical journals, as well as participation in national and international conferences.

She is a member of the Bulgarian Society of Ophthalmology and the Bulgarian Medical Union.

Relevance of the problem:

The topic of prevention and protection of children's eye health is extremely relevant and of great social importance. There are a number of difficulties associated with the organization and conduct of screening for retinopathy of prematurity, for the early detection of refractive errors and their correct correction, the treatment of amblyopia, etc. With the introduction of digital devices into children's lives, the frequency of myopia and its progression are increasing, which on the one hand requires the implementation of educational programs among parents, and on the other hand, training of ophthalmologists in the correct use of methods for controlling myopia. The lack of a national preventive program for controlling children's vision in our country increases the need for regional ones, as well as for conducting epidemiological studies proving the need for such programs. In this sense, the topic of the dissertation is relevant and socially significant.

Structure of the dissertation:

The dissertation is structured according to the established requirements and is written on 148 pages, including 39 figures and 23 tables. The dissertation contains the following sections: Table of Contents – 3 pages, Summary – 3 pages, Abstract – 3 pages, List of abbreviations used – 1 page, List of figures – 2 pages, List of tables – 2 pages, Introduction – 2 pages, Literature review – 57 pages, Aims and objectives of the study – 1 page, Methods – 2 pages, Results – 44 pages, Discussion – 18 pages, Conclusions – 1 page, Contributions – 1 page, Publications – 1 page and Bibliography – 8 pages. 255 literary sources are cited, of which 14 are in Cyrillic and 241 – in Latin.

The literature review presents the main types of eye pathology in childhood – inflammatory diseases, refractive anomalies, amblyopia, strabismus, injuries, retinopathy of prematurity, congenital diseases – glaucoma, cataracts and those of the lacrimal ducts, as well as rare diseases. Emphasis is placed on the impact of digital devices and the COVID-19 pandemic on children's vision. A separate section is dedicated to the impact of digital devices on children's eye health - a factor recognized as a serious risk in the modern environment. Global epidemiological data with

results from Asia, Africa, Australia, North America (USA), Europe and Bulgaria are also presented, emphasizing the need for national programs for the prevention of children's eye health.

The aim of the study is to create an epidemiological picture of children's eye morbidity in the city of Shumen, to track the factors modulating its characteristics and to formulate recommendations for ensuring positive prospects for children's eye health, based on the results obtained.

To achieve the goal, the doctoral candidate has set himself **five** clearly formulated **tasks**:

1. Collection of medical information from ophthalmological examinations of children (0-17 years old inclusive) from three medical institutions - DKC1 Shumen EOOD, MC MHAL Shumen EOOD and ASMP on OB "Dr. Ralitsa Emilova Neykova-Marinova" EOOD for the period 01.01.2019 - 31.12.2022.

2. Statistical analysis of the distribution of ophthalmological pathology in childhood on the territory of the city of Shumen for each year of the research period and in total for the entire research period.

3. Tracking the dynamics of pediatric eye morbidity in the period before, during and after the COVID-19 pandemic.

4. Comparison of the results obtained with data from studies on the distribution of pediatric eye pathology from foreign and local literary sources.

5. Formulation of recommendations for optimizing ophthalmological screening in childhood.

Research methods:

The study is a retrospective analysis of primary outpatient ophthalmological examinations of children (0–17 years) in the city of Shumen for the period 2019–2022. The data were collected from three healthcare facilities and include the following information - date of examination, age and gender of the patient, leading diagnosis, according to the International Classification of Diseases (ICD – 10), basic demographic characteristics. The study analyzed only primary eye examinations, with secondary visits excluded, in order to prevent double counting of the same diagnosis in a given patient. The diagnoses are grouped thematically to facilitate analysis. For statistical processing of the results, the non-parametric Pearson test /2χ criterion/ for hypothesis testing was applied, which is based on the comparison of actual frequencies and theoretical frequencies. Descriptive analysis, independent t-test (at a significance level of $p \leq 0.05$), analysis of

variance (with Student's t-test at a statistical significance level of $p \leq 0.05$), ANOVA (at a significance level of $p \leq 0.05$) were also applied. The software product SPSS, version 19.0., windows 11, Excel-2020 was used. The study is methodologically clearly structured and provides a reliable basis for epidemiological assessment of pediatric eye morbidity in the region.

The results of the study present a clear and structured epidemiological picture of pediatric eye morbidity in the city of Shumen for the period 2019–2022. For 2019, 697 individuals were studied, for 2020 – 679, for 2021 – 581, and for 2022 – 622 individuals. The average age of children for each year of the study period is 10 years old, the distribution by gender is as follows: 1310 female children and 1269 male children. The most common pathology is refractive anomalies, especially among adolescent girls, which corresponds to global trends. The frequency of accommodative disorders and asthenopia in school-age children is also high - a problem directly related to increased screen time. Inflammatory conditions, such as infectious conjunctivitis and blepharitis, are also common, especially in younger children. For the entire monitored period, the most common is mucopurulent conjunctivitis 6.11%, of the inflammatory diseases of the eyelids it is hordeolum - 5.14%, inflammatory diseases of the cornea, uvea and sclera are relatively rare, on average 0.55% for the entire period. Acute atopic conjunctivitis has an average frequency of 5.14%. The total frequency of refractive errors remained relatively constant throughout the years of the study period, but dynamics were observed in the distribution of diagnoses in the group. In each of the years studied, myopic refraction was the leading prevalence (average for the entire period 21.06%), with the diagnosis "Myopia" showing a constant increase from the beginning to the end of the study period (from 18.55% to 23.55%). Astigmatism was in second place (16.82% for the entire period), with the most cases registered in 2019 (126). After reporting a slight decline in 2020, in 2021 its frequency increased again, but at the end of the period a decrease was again observed in the number of children with the leading diagnosis "Astigmatism". The general trend is for a decrease in the prevalence of this diagnosis from the beginning to the end of the period 2019-2022. Hyperopia is the least common leading diagnosis in the group of refractive errors, although the prevalence is significantly closer to that of astigmatism (16.43% and 16.82%, respectively, for the entire period). The prevalence of the diagnosis "Hyperopia" remains relatively constant for 2019 and 2020 (17.54% and 17.99%, respectively), but in the following two years it decreased, reaching 14.68% in 2022. The data reveal gender and age differences in the prevalence of individual diagnoses, which reinforces the need for targeted prevention. Of particular interest is the reported increase in

myopia and visual fatigue during the COVID-19 pandemic, in parallel with a decrease in infectious conjunctivitis – a result that supports the influence of social and behavioral factors on vision. Rare diseases, such as amblyopia, strabismus, congenital and tumor pathologies, were reported with a low frequency, but also found their place in the analysis. Malignant neoplasm of the retina was detected once for the entire study period, the case being registered in 2020. The average frequency of strabismus was 2.41% for the entire period, of traumatic injuries – 3.85%, accommodative disorders, headache, asthenopia – 11.18%, amblyopia – 0.62%. In congenital diseases, the distribution is as follows – cataract – 0.04%, glaucoma -0.08%, iris coloboma – 0.04%, ptosis – 0.08%. The study offers a reliable basis for future policies in the field of children's eye health and emphasizes the need for national screening and prevention programs. The results for the distribution of nosological units by age groups are also presented.

The chapter **"Discussion"** presents an in-depth interpretation of the results, emphasizing the limitations arising from the specific profile of the studied group and emphasizing the importance of systematic eye screening in childhood. The author compares the obtained data with national and international literary sources, which gives scientific validity and relevance to the analysis.

As a critical remark to the dissertation, I would like to note that there are no clearly formulated recommendations for optimizing ophthalmological screening in childhood, which would respond to the fifth task set for implementation.

The dissertation formulates **six main conclusions** related to the results of the study:

1. The results of the study are statistically significant and comparable with data from the world scientific literature.

2. The characteristics of pediatric eye morbidity in the territory of the town of Shumen are close to those registered in other cities of Bulgaria, as well as in other European countries, but have their own individual characteristics, the most prominent of which is the high frequency of accommodative disorders and asthenopia.

3. The coronavirus pandemic and anti-epidemic measures are associated with both an increase in the frequency of myopia and an increase in accommodation disorders and asthenopia complaints in the pediatric population in the town of Shumen.

4. The decrease in the frequency of infectious conjunctivitis in childhood during the period 2020-2021 can be considered as a positive side of the measures introduced to limit the spread of COVID-19.

5. It is necessary to organize an annual program for the prevention of children's eye health at the national level, which should be comprehensive, generally accessible and tailored to the characteristics of children's eye morbidity in the study area.

6. There are many methods for limiting the main factors in the external environment that increase the risk of developing myopia in childhood, which are easily applicable, non-invasive, financially unburdening and would significantly reduce the risks to children's eye health in the modern digitalized world.

Of the **contributions** indicated in the dissertation, the most important ones are those of a scientific and applied nature:

1. A statistical analysis of the distribution of eye diseases in childhood for the period 2019-2022 on the territory of the town of Shumen was conducted.

2. The dynamics of children's eye morbidity in the period before, during and after the COVID-19 pandemic were monitored.

Dr. Marinova has presented two publications related to the topic of the dissertation. The abstract is written on 72 pages and presents the dissertation.

Conclusion:

The dissertation represents a completed scientific study that meets the requirements for awarding the educational and scientific degree "doctor". The author demonstrates in-depth knowledge of the topic, applies modern methods of scientific analysis and skillfully interprets the results. I give a positive assessment of the dissertation and propose to the members of the scientific jury that Dr. Slavyana Malcheva-Marinova be awarded the educational and scientific degree "doctor" in the professional field of "Medicine", scientific specialty "Ophthalmology".

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