Statement

by

Assoc. Prof. Dr. Dobrinka Mitkova Damyanova, MD, PhD

Regarding the dissertation work for the awarding of the ONS "doctor" in the

Field of higher education: 7. Health care and sports, Professional direction:

7.2. Dental Medicine,

Scientific specialty: "Pediatric Dentistry"

The subject matter under discussion pertains to the dissertation:

"NUTRITION AND ITS INFLUENCE ON ORAL HEALTH DURING ADOLESCENCE"

Author of the dissertation: Dr. Kristiyana Lyubomirova Mineva

Academic advisor: Assoc. Prof. Dr. Milena Todorova Georgieva – Dimitrova, MD, PhD

Biographical data of the doctoral student:

Dr. Kristiyana Mineva graduated from higher education in 2019 with excellent results at the Medical University "Prof. Dr. Paraskev Stoyanov" in the city of Varna. Since 2020, she has been a full-time assistant in the Department of "Pediatric Dentistry" at the Faculty of Dental Medicine in the city of Varna. Since 2020, she has been working in your clinical practice as a dentist at the University Medical and Dental Center (UMDC) at the Faculty of Dental Medicine, the city of Varna.

In 2021, Dr. Mineva was enrolled in specialization and full-time doctoral studies in "Pediatric Dentistry". Dr. Kristiyana Mineva allows her to develop her professional experience through participation in courses in Bulgaria and abroad, in seminars and congresses. She is fluent in English. She is a member of Bulgarian Dental Association, National Association of Pediatric Dentists, International Association of Pediatric Dentistry (IAPD).

General Characteristics of the Dissertation Work and Relevance of the Scientific Problem:

Diet and nutrition play a fundamental role in sustaining the overall and oral health of the population. Diet is defined as the total quantity of food consumed by an individual, whereas nutrition encompasses the process of utilizing food for growth, metabolism, and tissue repair. In contemporary settings, dietary guidelines have been established to provide recommendations

regarding the consumption of various foods and beverages, with the objective of promoting a diet that satisfies nutritional requirements and preventing diet-related ailments such as dental caries and childhood obesity. Nutrients, categorized based on their necessary quantities for normal metabolism, growth, and physical well-being, are divided into two categories: macronutrients, which include proteins, carbohydrates, and fats, and micronutrients, which encompass vitamins and minerals. Among the macronutrients, fats serve as the most energy-dense option, while carbohydrates are quantitatively the most significant dietary source of energy for the majority of populations. Proteins function as crucial structural and functional components in every cell of the body and are indispensable for growth, repair, and the maintenance of health. Vitamins and minerals, present in minute quantities in most foods, are essential for normal metabolic function.

Structure of the Dissertation

By Order No. P-109-234 dated May 21, 21.05.2025, of the Rector of the Medical University - Varna, I have been elected as a member of the Scientific Jury. Based on Protocol No. 1 dated May 30, 30.05.2025, I am hereby authorized to prepare a statement regarding the procedure for the acquisition of the educational and scientific degree "Doctor" for candidate Dr. Kristiyana Lyubomirova Mineva at the Medical University in the city of Varna.

The dissertation comprises 291 pages, partitioned into distinct sections. The content is illustrated with 44 tables, 20 figures, and 20 appendices. The bibliography encompasses 503 literary sources, of which 5 are in Cyrillic and 498 are in Latin.

The publications pertinent to the dissertation consist of 3 issues in English. Furthermore, the doctoral student has presented two participations in scientific forums and international conferences, showcasing posters in both Bulgarian and English.

Content of the Dissertation

The dissertation authored by Dr. Kristiyana Mineva is composed with a high level of competence and thoroughness. It further illustrates the author's proficient understanding of the issues addressed in the scientific literature. The structure of the work adheres to the conventional format of a dissertation.

The literature review is organized into distinct sections. It provides readers with a contemporary overview of the literature pertaining to the dissertation's subject, thereby familiarizing them with its significance in the context of its development period.

The main objective of the dissertation is clearly articulated: to examine the correlation between nutrition and oral health during adolescence.

The three tasks delineated are appropriately linked to this objective: 1. To conduct a comprehensive analysis of the nutritional status of children aged 11 to 17 years; 2. To undertake a comparative assessment of the principal indicators of oral health amongst children aged 11-17 years, distinguishing between those with impaired nutritional status and those without specific preventive measures, thereby incorporating these findings into a preventive nutrition program; and 3. To formulate key guidelines for regulated, balanced nutrition concerning oral health in adolescents

(11-17 years). This research involves participants from a cross-sectional study conducted between 2023 and 2024. A convenience sample comprising 300 adolescents aged 11-17 years, who attended a primary examination at the Medical University "Prof. Dr. Paraskev Stoyanov" in Varna, specifically at the University Medical and Dental Center and the clinical facilities of the Department of Pediatric Dentistry, was selected. The child patients are in satisfactory general health within the specified age range. A voluntary declaration of informed consent from a parent, alongside an expressed willingness for their child to partake in the study, has been duly completed. The doctoral candidate has clearly defined exclusion criteria pertaining to the study.

The materials, methods, and methodologies employed are delineated rigorously and in accordance with the established scientific and research principles sanctioned for the execution of a Dissertation.

The observational units examined by the doctoral candidate include: 1) demographic indicators, 2) anthropometric indicators, and 3) dietary quality and dietary indicators. The observation signs are: 1) age and gender; 2) height, weight, HAZ-index, body mass index (BMI), and body mass index for age (BMIZ); and 3) The Diet Quality Index for Adolescents (DQI-A) comprises a food diary and questionnaire focused on various aspects of dietary management, including the quantity and quality of food intake, physical activity, accessibility of food, lifestyle choices, and detrimental habits of the child. It also evaluates risk factors, eating frequency, personal preferences, and dietary practices, utilizing reduced task methods such as the DQI-A score, DMFT index, DMFS index, ICDAS, OHI-S, PCR, papillary bleeding index (PBI), CarieScan Pro system, among others.

The results of the research and the studies conducted by the doctoral students are original in nature, fulfill the supplementary tasks, and are presented and illustrated in a detailed and accurate visual manner. The findings indicate that boys demonstrate a greater height, with a mean of 165 cm (152;172), in contrast to girls, who exhibit a mean height of 161 cm (153;165) ($p < 0.01$). Furthermore, the author identified a statistically significant difference in height between the two sexes ($p = 0.013$). Boys also possess a higher body weight, averaging 59 kg (49; 68) compared to girls, whose mean weight is 56 kg (49; 65) ($p = 0.36$). The values for the HAZ score reveal that boys have a mean of 0.72 (0.29;1.59) ($p < 0.001$). The average BMI for boys was found to be 22.4 (20.7; 23.7), while for girls it was 22.8 (20.4; 24.9). No statistically significant difference was observed in the BMI measurements ($p = 0.06$) along with other measures. The mean value of DQI-A in the 157 girls examined was 37% (34; 68), and for the 143 girls analyzed, it was 34% (25; 57) ($p < 0.001$). A strong positive and statistically significant correlation was noted between dietary quality and disturbances in the nutritional status of the children studied (Kendall Tau-B = 0.65, $p < 0.001$). This suggests that children with poor nutritional quality are overweight and "at risk of obesity". A medium strength relationship was established between the intensity of physical activity and dietary quality (Cramer V = 0.2, $p = 0.002$).

The doctoral student discovered that the largest percentage of teenagers (56.3%) allocate between 5 and 6 hours to activities in front of the television/computer screen ($p = 0.03$). Within this group, a majority of boys, specifically 7.3%, surpass 6 hours of screen time ($p < 0.001$), while 30% report spending between 3 and 4 hours ($p < 0.001$), and only 6.3% engage in screen time for less than 2 hours ($p < 0.001$). Among the adolescents, 280 individuals consume home-cooked meals for breakfast. A relative proportion of both genders exhibited low dietary quality ($p > 0.05$). Of all the

boys studied, 83 indicated a preference for "fast food". Among this subset, 58% displayed low dietary quality, 23% maintained an average dietary quality, and 19% possessed a high dietary quality. The remaining 74 boys do not partake in this type of food, with 36% demonstrating a high dietary quality. In the experimental group, the median Decayed, Missing, and Filled Teeth (DMFT) index during the control examination was recorded at 6 (3;7), whereas in the control group, it was observed at -8 (6;11) (p <0.001). The doctoral student presented a robust correlation between the criteria for the severity of the carious process as per the International Caries Detection and Assessment System (ICDAS) and spectroscopy using the CarieScan Pro device. These relationships are statistically significant. There exists a very strong correlation between ICDAS 1 and CSP 1 (ρ(rho) = 0.96, p < 0.001), ICDAS 4 and CSP 4 (ρ(rho) = 0.85, p < 0.001), ICDAS 5 and CSP 5 (ρ(rho) = 0.94, p < 0.001), as well as between ICDAS 6 and CSP 6 (ρ(rho) = 0.9, p < 0.001). Additionally, a functional correlation is evident between ICDAS 2 and CSP 2, along with ICDAS 3 and CSP 3 (ρ(rho) = 1, p <0.001). Dr. Kristiyana Mineva also prepares informative motivational materials for patients and their parents regarding the impact of nutrition on adolescent health, similar to the My Plate model recognized in literature and society.

The following conclusions have been derived from the results of the doctoral student's research:

Conclusion 1: Over two-thirds of the examined adolescents are classified as overweight and fall into the category designated as having a "risk of obesity". A comparison of height and body mass during the respective age period indicates that the primary concerns among adolescents pertain to their body weight.

Conclusion 2: The research indicates that the largest proportion of the studied adolescents exhibit low diet quality, as reflected by the Diet Quality Index-Adolescents (DQI-A) score.

Conclusion 3: The study establishes that both the age and gender of adolescents influence dietary quality, with the dietary quality within the nation significantly impacting the nutritional status of the participants. Notably, female adolescents possess poorer dietary indicators in comparison to their male counterparts.

Conclusion 4: Low diet quality is associated with heightened overall stress levels, extended screen time, insufficient physical activity, minimal water intake, excessive food consumption, a preference for high-calorie snacks, daily intake of sugary foods, items with added sugar or honey, "fast foods," iced tea, sweetened tea, natural and fruit juices, soft drinks, and energy beverages, in addition to detrimental habits such as smoking, alcohol consumption, and coffee intake.

Conclusion 5: Among adolescents with high diet quality, there exists a notable preference for home-cooked meals, a tendency towards consuming raw foods, seeds, and nuts, increased intake of dairy products, white meat, utilization of artificial sweeteners (sugar substitutes), incorporation of dietary supplements, and a keen interest in the composition, nutrient content, and caloric value of food labels on packaged items.

Conclusion 6: Following a six-month follow-up period, statistical analysis of the gathered data reveals a negative trend in oral health indices within the control group, contrasted by positive trends

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or stabilization of certain indices in the experimental group after an enhancement of DQI-A by 22%. Lastly, Conclusion 7: An improvement in dietary effectiveness yields beneficial effects primarily by reducing the prevalence and activity of carious lesions, curbing the onset of dentinal caries and its complications, diminishing plaque accumulation, facilitating gingival inflammation, and enhancing the oral health risk profile among adolescents.

Statistical Processing of Results

1. Descriptive Methods: Frequency analysis is employed to calculate absolute and relative frequencies (%) of qualitative variables (nominal and ordinal). Variance analysis of quantitative variables involves the calculation of the central tendency through arithmetic mean and median, as well as variability through standard deviation, quartiles, interquartile range, and the 95% confidence interval.

2. Hypothesis Testing Methods: Techniques for assessing the normality of the distribution of quantitative variables include the Kolmogorov- Smirnov test (for sample sizes over 30) and The Shapiro–Wilk test (for sample sizes under 30). For the comparison of two independent samples, depending on the type of distribution, the Student's t- test, Mann- Whitney test (for independent samples), and Wilcoxon rank test (for dependent samples) are utilized. For comparisons involving more than two groups, analysis of variance (ANOVA) and the Kruskal- Wallis test are applied, followed by Post Hoc tests for multiple comparisons.

For the analysis of categorical variables, Pearson's χ^2 criterion, Fisher's exact test, and the Kramer method are employed. To investigate correlations, the Pearson correlation coefficient or Spearman's rank correlation coefficient is utilized. The significance level of the null hypothesis is set at a predetermined value of $\alpha = 0.05$.

For statistical analyses, the statistical software packages SPSS for Windows, version 25, Jamovi, version 2.2.4, and Microsoft Excel were employed.

Ethical Reviews: The clinical study was conducted in accordance with the principles of the Declaration of Helsinki and the Clinical Trials Directive 2001/20/EC of the lower parliament. The study and its documentation were authorized by protocol No. 125/26. 26.01.2023. 2023 from the Research Ethics Committee at the Medical University of Varna.

The dissertation serves as a valuable resource for undergraduate and graduate students. Additionally, it is beneficial for dentists, pediatricians, and nutritionists as they incorporate nutrition education into their medical and dental practice.

The review accurately and correctly reflects the content of the dissertation.

The following contributions are made to the theory and practice of the authors' research on nutrition and its relationship with oral health for adolescents aged 11 to 17:

Original Contributions:

1. For the first time in our country, the DQI-A score was employed to study the effectiveness of the diet, and a relationship with anthropometric indicators was established in adolescents aged 11-17.

2. It has been demonstrated that the reduction in the Diet Quality Index for Adolescents (DQI-A score) is influenced by the gender and age of the studied adolescents, their dietary habits, frequency of meals, types, quantities, and quality of food consumed during main and intermediate meals, as well as various risk factors, personal preferences, and eating habits.

3. It has been established that adolescents who monitor the composition, content, and caloric value provided on food labels tend to have a higher DQI-A score.

4. For the first time, the dynamics of the principal oral health indicators, following dietary improvements (DQI-A score), have been demonstrated through the implementation of specific nutritional recommendations within a preventive program for the studied adolescents.

5. An algorithm comprising 29 nutritional recommendations has been developed and validated to enhance dietary quality in relation to oral health among adolescents.

The dissertation also contains **confirmed contributions**.

I affirm the contributions and believe that they are largely refined based on the dissertation, representing the doctoral student's original work.

The dissertation is characterized by a precise interpretation of complex dental issues, a clear and accessible style, with comprehensively presented results from the application, leading to the formulation of three tasks for the author's thesis. The results of the dissertation work can be utilized in future research as well as in the practical application of methods in dental clinics dealing with children at high risk of caries and periodontal diseases, children who are obese or overweight, and children with eating disorders.

In conclusion, I extend my positive assessment of the dissertation work, overall research efforts, and the clinical and pedagogical activities of the doctoral candidate. The dissertation fulfills all minimum scientometric criteria established by MU-Varna in accordance with the Regulations for the Development of the Academic Staff (PRAS of MU-Varna), adheres to the Law on the Development of Academic Personnel in the Republic of Bulgaria (LAADRB), and complies with The Regulations for the Implementation of the Law on the Development of Academic Staff in the Republic of Bulgaria (ADSRB).

As a member of the Scientific Jury, I hereby express my affirmative vote in favor of conferring the educational and scientific degree of "Doctor" to Dr. Kristiyana Lyubomirova Mineva, specializing in the field of higher education 7, Health and Sports, with a professional focus on 7.2, Dental Medicine, and the scientific specialty of "Pediatric Dentistry."

13 June 2025   Prepared by

/ Associate Professor Dr. Dobrinka Damyanova, PhD, MD/