Review

of dissertation work for obtaining an educational and scientific degree "Doctor" in the scientific specialty Pediatric Dental Medicine, professional field 7.2 Dental medicine, field of higher education 7. Health and sports

of Dr. Elena Todorova Dimova - PhD student in full-time training in the doctoral program "Pediatric Dental Medicine", professional field 7.2. Dental medicine

on topic "Prevalence of white spot lesions in patients with fixed orthodontic technique and their correlation with the level of plaque control and gingival inflammation"

Supervisor:

Prof. Dr. Radosveta Stoyanova Andreeva – Borisova, MD, PhD, DSc

by Assoc. Prof. Dr. Dobrinka Mitkova Damyanova, MD, PhD – habilitated in a professional field 7.2. Dental Medicine, Medical University - Varna, internal member of the Scientific jury, based on an order of the Rector of Medical University „ Prof. Dr. P. Stoyanov" - Varna, N P-109-297/12.07.2021 and Protocol №1 / 21.07. 2021 of the Scientific Jury

Dr. Elena Todorova Dimova presented documents that are in accordance with the Regulations for the Development of the Academic Staff at the Medical University "Prof. Dr. Paraskev Stoyanov" - Varna, according to Section III. Deduction of doctoral students. The prepared documentation is arranged and formatted correctly and meets the administrative requirements of the Medical University - Varna.

Dr. Elena Todorova Dimova is enrolled as a full-time doctoral student with Order № P-109-50 / 01.02.2019 at the Department of Pediatric Dental Medicine, Faculty of Dental medicine – Varna with scientific supervisor: Prof. Dr. Radosveta Stoyanova Andreeva - Borisova, MD, PhD, DSc. During the period of preparation and implementation of her regular doctoral program, Dr. Dimova has followed the procedure and criteria regarding the requirements for full-time training in doctoral studies and presents her administrative documents regularly and in the necessary time. Dr. Elena Dimova accomplished her doctoral program with the right to defend the dissertation on

the topic: **"Prevalence of white spot lesions in patients with fixed orthodontic technique and their correlation with the level of plaque control and gingival inflammation"** by order of Prof. Dr. Valentin Ignatov, MD, PhD, DSc - Rector of the Medical University "Prof. Dr. Paraskev Stoyanov "- Varna N R-109-297 /12.07.2021

Biographical data

Dr. Elena Todorova Dimova was born on 12th of October, 1992 in the town of Dobrich. She graduated from the Faculty of Dental Medicine at the Medical University "Prof. Dr. Paraskev Stoyanov "- Varna. She is a regular member of the Bulgarian Dental Association and the National Association of Pediatric Dentists in Bulgaria. She speaks English at an excellent level and graduated from the Humanitarian High School "St. St. Cyril and Methodius" in Dobrich in 2011.

Structure and sections of the dissertation

The dissertation consists of 166 pages and is structured according to the requirements of the Regulations for the Development of the Academic Staff at the Medical University "Prof. Dr. Paraskev Stoyanov "- Varna and Section III. Deduction of doctoral students with the following sections: Introduction; First chapter. Literature review; Chapter Two. Aim, tasks and hypotheses; Chapter three. Methodology of the dissertation; Chapter four. Results and discussion with analysis of the obtained results; Concluding remarks; Conclusions; Contributions; List of publications related to the dissertation – 3; Bibliography - 305 literary sources, 9 of which are in Cyrillic and 296 in Latin.

The dissertation is illustrated with 23 tables, 69 figures and 10 appendices.

Relevance of the developed problem

Dental caries begins below the surface layer of enamel when there is a change in the balance between demineralization and remineralization. The formation of early (initial) caries, commonly referred to as a white spot lesion (WSL), is an unaesthetic, common side effect of orthodontic treatment with fixed appliances. The elements of the fixed orthodontic technique

increase the retention of plaque and food on the smooth and healthy tooth surfaces. In healthy patients with proper occlusion, such lesions have a low prevalence. Despite the efforts to educate and motivate patients regarding oral hygiene, enamel demineralization associated with fixed orthodontic appliances remains a significant clinical problem in our practices.

The health of the oral cavity depends on the healthy behavior of the individual, the patient in childhood . Assessment of oral health during the first months of treatment, intensive oral hygiene training, and often repetitive motivation can be considered as techniques for improving individual health behavior. This allows management of the caries process during fixed orthodontic therapy and reduces his prevalence, similar to that in orthodontically untreated patients. The presence of new white spot lesions in some patients may be attributed to a lack of cooperation.

A review of the literature reported by many authors shows large variations, from 2% to 97% prevalence of white carious lesions occurring during orthodontic treatment. Much of the variation in WSL detection is related to analytical methods. The frequency and prevalence of white carious lesions varies according to gender. Some studies show that female patients have a high incidence of white carious lesions, while others show that no significant differences in the prevalence of lesions have been found. In the dissertation of Dr. Dimova a connection is found between the male sex and the greater prevalence of white carious lesions in patients treated with a fixed orthodontic technique.

LITERATURE REVIEW - state of the problem

The literary sources reviewed and analyzed by Dr. Elena Dimova are 9 by well-known Bulgarian authors in Bulgaria and 296 in English by foreign authors. Consistently and in detail, the author presents to the attention of readers all the significant problems, analyzing in depth and in detail the articles, reports and literature on her chosen topic. For point 1.1 Fixed mechanically operating orthodontic appliances - elements, types: Dr. Dimova emphasizes that the **advantage** of fixed orthodontic appliances is that they have a continuous effect on the dental system, which does not depend on cooperation in the treatment process of the patient. The author has described in detail the types of fixed orthodontic appliances (braces), the most common appliances used in

orthodontics, as well as the materials from which they are made. A historical reference has been made for their introduction in our dental practice. In point 1.2. White spot lesions as a complication of orthodontic therapy, Dr. Elena Dimova describes in detail and characterizes the white carious lesion, defined as "subsurface porosity of the enamel, as a complication for clinical diagnosis due to result the process of demineralization", as its formation is the initial stage of the carious lesion, which occurs because of already developed "carious process" with its etiological and risk factors.

In the epidemiology section the author examines in detail the literature sources and the percentage of lesions relative to the period of treatment and in the **etiology section** - the hundreds of bacterial species present in the oral cavity, and the individual characteristics with individual distribution varying both qualitatively and quantitatively.

The following are defined: Demineralization of the enamel; pH of dental plaque; Duration of treatment with braces; Eating habits; Oral hygiene habits; Socio-economic status; Gender; Time; Saliva; Methods for diagnosis, evaluation and differential diagnosis of white carious lesions of the enamel; DIAGNOdent diagnostics; Photographic analysis; QLF; Differential diagnosis; Determination of oral risk profile; Dental biofilm and fixed orthodontic appliances; Gingival health and fixed orthodontic appliances; The microbiological changes and their influence on the pathology studied by the author in the topic.

The doctoral student (PhD student) has in-depth and specialized theoretical and practical knowledge and skills for the selection of reliable and relevant literature and authors on the scientific topic. Consistently and smoothly analyzes the articles, reports and other literature sources studied by her. The bibliography has enough contemporary authors, including from the last 10 years to the date of the deduction.

AIM, TASKS AND HYPOTHESES

The aim of the topic and the set tasks are precisely and clearly formulated, depending on the problems set by the doctoral student.

METHODOLOGY OF THE DISSERTATION WORK

The methodology of the topic is adequate and well chosen. The author examined 246 patients who had passed through the University Medical and Dental Center of Faculty of Dental

medicine - Varna at the Medical University - Varna and patients treated by other dental specialists for a period of 2 years. Patients are divided into two groups: First group - 123 patients who undergo orthodontic treatment with a fixed technique (braces); Second group - 123 patients who visited the dental offices on another occasion. The selection of patients is based on well-defined criteria and patients are aged 12-18 years with permanent dentition. The initial diagnostic threshold is D1a, the earliest carious lesions are diagnosed, which may undergo reversal after their non-operative preventive intervention, and the oral risk profile of the patients was examined. The groups of the examined patients are standardized by sex, age, type of braces and according to the caries risk. The duration of the study performed by Dr. Dimova is two years.

The examination of the patients is divided into four stages: Stage I: Preliminary examination of the patients indicated for orthodontic treatment; Stage II: One month after the placement of the braces; Stage III: 6 months after placing the braces; Stage IV. Retention phase of treatment, all in line with WHO recommendations. Clinical trials include: Oral Hygiene Index - OPI (Orthodontic Plaque Index) - by Beberhold and colleagues; Gingival index (Löe and Silness); EDI - Banks and Richmond index to determine the prevalence of white carious lesions around the braces and their number near the surface of the braces; Gorelick index for assessing the severity of lesions - Gorelick index; Activity of carious lesions; DMFT index and a short survey to assess the risk profile for the development of white carious lesions in patients undergoing orthodontic treatment with a fixed technique.

The **statistical methods** applied for processing the results **are correct for the performed analysis** - SPSS v. 20.0, using the following analyzes: Analysis of variance (ANOVA), Variation analysis, Correlation analysis, Regression analysis, Risk assessment analysis, Comparative analysis (hypothesis evaluation), Graphical and tabular method of displaying the obtained results. It is accepted level of significance $p< 0.05$ is assumed for all performed analyzes.

RESULTS, DISCUSSION and CONCLUSIONS

From the performed methodology, the obtained results and discussion the doctoral student Dr. Elena Dimova has made 10 significant conclusions: The orthodontic treatment with a fixed technique is a risk factor for higher caries and poor oral hygiene in adolescents; The duration of orthodontic treatment with a fixed technique is associated with higher caries,

deterioration of oral hygiene and the development of gingivitis; Male gender is a risk factor for elevated EDI and GI and Gorelick indices, as well as OPI and OHI indices; Metal braces carry a higher risk of developing white carious lesions and gingival inflammation; The duration of orthodontic treatment is associated with deterioration of oral hygiene due to loss of motivation and cooperation from the patient; No difference was found in the sex and age of the patients in terms of the severity of the white carious lesions; A risk factor for aggravating white carious lesions during orthodontic treatment is the duration of treatment, metal braces and the patient's lack of cooperation; Lack of cooperation and poor oral hygiene from the patients, which undergoing treatment with a fixed orthodontic technique determine the higher degree of gingival inflammation; The high caries risk in orthodontic patients correlates with the patient's lack of cooperation, inadequate plaque control and non-compliance with dietary change recommendations.

The development of individual prevention programs, motivating the patient and maintaining constant cooperation in the implementation of measures for good oral hygiene in the treatment process is a key factor for success in the prevention of lesions.

Abstract of the dissertation and publications related with the dissertation

The summary was prepared in accordance with the The Law on the Development of the Academic Staff in the Republic of Bulgaria (LDASRB) and the Regulations of the Medical University "Prof. Dr. Paraskev Stoyanov "- Varna. It is a short version of the applied methods, developed tasks, the obtained results and conclusions in the dissertation. The author has published 3 articles on the topic of the dissertation.

CONTRIBUTIONS AND CONCLUSION

The contributions are adequately divided into contributions with: 1) original for the country character, 2) with practical-applied character and 3) with confirmatory character. Those with an original character for the country have a greater weight for the evaluation of the success of the doctoral student.

The dissertation of Dr. Elena Todorova Dimova presented for defense on the topic **"Prevalence of white spot lesions in patients with fixed orthodontic technique and their correlation with the level of plaque control and gingival inflammation"** is characterized by theoretical and clinical relevance, sound methodology and own contributions, which reveal prophylactic approaches useful for pediatric dentists which treat children with fixed orthodontic appliances.

I will vote convincingly with "YES" for the award of Educational and Scientific degree "DOCTOR" in the scientific specialty Pediatric Dental medicine in the doctoral program "Pediatric Dentistry", professional field 7.2 Dental Medicine **of Dr. Elena Todorova Dimova and recommend to the members of the Scientific jury also give their positive vote.**

20.08.2021

Varna

Reviewer: .....

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