Review

of a dissertation for awarding an educational and scientific degree "Doctor" in a scientific specialty 03. 03. 01. Therapeutic dental medicine, in a professional field 7. 2 Dental medicine in the field of higher education 7. Health and sports

of Dr. Georgi Plamenov Georgiev, doctoral student in free form

on the topic **„Problems associated with photopolymerization in dentistry"**

scientific advisors

Prof. Eng. Tsanka Dikova, D.Sc

Prof. Dr. Vladimir Panov, D.Sc.

from **Prof. Dr. Radosveta Vasileva, MD, PhD** , Head of the Department of Conservative Dentistry, FDM, Sofia, external member of the Scientific council, determined by Order № P-109-115 / 31. 03. 2021 of the Rector of MU Varna and Protocol №1 / 09. 04. 2021 of the Scientific council

The set of documents submitted by Dr. Georgi Plamenov Georgiev is in accordance with the Regulations of the Medical University of Varna (Section III, expulsion of doctoral students). The prepared documentation is diligently and correctly formed and meets the requirements of MU Varna.

Dr. Georgiev is enrolled as a free doctoral student in the Department of Conservative Dentistry and Oral Pathology, FDM - Varna with scientific advisor Prof. Eng. Tsanka Dikova and Prof. Dr. Vladimir Emanuilov Panov (order №R-109-142 / 18.05.2018). During the 3 years of his training he followed the procedure regarding the requirements for free doctoral studies and submitted the required administrative documents on a regular basis. He was expelled with the right to defend by Order №-P -109-115 / 31. 03. 2021 of the Rector of MU - Varna.

Brief biographical data

Dr. Georgi Plamenov Georgiev was born on June 15, 1988 in the city of Varna. In 2013 he graduated from higher education at FDM, MU-Varna. Since October 1, 2014 he has been an assistant at MU - Varna. He is a member of the BZS. He speaks English. He graduated from 5th Language School "Yoan Ekzarch" in 2007.

Structure and sections of the dissertation

The dissertation of 197 pages is structured according to the requirements of the Regulations for the development of the academic staff of MU - Varna (p. 35) and includes introduction, literature review - 42 pages, analysis of the literature review - 1 page, aim and tasks - 1 page, material and methods - 17 pages, results and discussion on the results and conclusions to each task - 82 pages, conclusion – 1, 5 pages, contributions – 1, 5 pages, bibliography - 12 pages (4 in Cyrillic and 174 in Latin) and appendices - 25 pages. The latter are: publications and participation in scientific forums, a program for calculating the parameters of photopolymerization using Mat Lab software, results of regression analysis, recommendations and recommended modes for efficient light curing of dental composites. The dissertation is well illustrated with 20 tables and 45 figures.

The dissertation is planned to contain the usual literature review, aim and tasks and material and methods. The difference is that for each task results, discussion on the results and conclusions are reported. The work ends with a conclusion.

Relevance of the problem

The problems in photopolymerization are significant for every dentist, as well as for all colleagues working in the field of dental composites - study of working, aesthetic and functional properties of composites in a scientific aspect. These include mainly inadequate polymerization, which leads to a number of adverse effects - reduced hardness and wear resistance, increased risk of fractures of the restoration, elution of residual monomers, reduced adhesive bonding strength, and deterioration of the aesthetic properties of the restoration over time. These impacts could be promoted among the colleagues and recommendations should be given to minimize them. And the wide distribution of composites and their daily use make the topic relevant and significant and fully justify the efforts of the colleagues in search of approaches that optimize the polymerization stress of these materials. In this way, the health status of the contingent of our patients has been positively influenced.

Literiture review – state of the problem

Dr. Georgiev has included 178 literary citations in his bibliography. All significant problems existing in the discussed topic have been presented consistently and argumentatively - history of composite materials, composition and clinical application, polymerization process of dental composites, polymerization shrinkage and the factors influencing it, methods for reduction of polymerization shrinkage, types light curing units. Special attention is paid to the factors that determine the degree of conversion of the composite materials, light intensity and irradiation time, layer thickness, color of the composite, distance and direction of the tip of the light curing unit to the irradiated surface, type and amount of fillers, as well as the temperature of the material. The awareness of dentists about the factors of photopolymerization and work with light curing units has also

been discussed. Numerous and significant publications in our and foreign specialized literature, incl. and from the last 10 years, as well as for a wider period of time.

Extensive knowledge on the topic have been demonstrated, coming from reliable sources, the writing style is clear and the work is understandable and easy to read with a logical connection between the different structural parts of the review. As a result of the analysis and the presented facts in the presentation of the review, the motivation of the doctoral student to conduct the current research work becomes clear. Numerous and significant publications in domestic and foreign specialized literature, incl. from the last 10 years, as well as for a wider period of time, have been reviewed.

Aim and tasks, material and methods of the research

The aim and the set tasks have been briefly formulated, in accordance with the unsolved problems. Efforts have been focused on the analysis of the factors influencing the polymerization process of dental composites. A total of 4 tasks have been identified, the last one having 2 subtasks.

The methods used are objective and reproducible - light intensity was measured with a digital radiometer under certain conditions in 10 light curing units. The materials for Task 2 include 94 regularly used LED units; in Task 3 135 composite samples were made, in which parameters such as Vickers microhardness on the top and bottom surface of the samples were determined, in 9 samples 4 additional measurements were made within 28 days. A special microhardness tester ZHV μ-S (Zwick/Roell, Germany) was used. In Task 4 regression analysis and calculation of the parameters of photopolymerization using MatLab software were applied, and a program based on the regression models was developed.

The results have been expressed in graphical and tabular form using Excel software, and the statistical analysis contains tests such as analysis of variance (ANOVA). The methods used successfully clarify and solve the set tasks.

Analysis of the results and discussion on the results

The results have been presented in detail in tabular, graphical and photo-documentary form, which helps to better perceive and illustrate the material being analyzed. In Task 1 five conclusions have been drawn. In Task 2 there are 4 conclusions, in Task 3 - 12 conclusions, which is too many, in Task 4 - 10 conclusions. There is a real discussion in Tasks 3 and 4. The analysis of the results is done professionally.

Discussion on the results

The discussion on the results and the commenting on them in the context of the literature is very scarce. In practice, they are available, albeit to a limited extent, in Tasks 3 and 4. It would be good for the author to compare his data with those of other colleagues who have worked and published on this specific topic.

Conclusions and recommendations

The conclusions as mentioned have been made after each task. They summarize the results obtained. I find the presence of 12 conclusions in Task 3 for too much stretching. The conclusions should be generalized and easy to understand, especially having in mind the applied nature of the dissertation.

The recommendations have been given at the end of the paper and are well formulated. They are aimed at practicing dentists.

Contributions and significance for science and practice

The doctoral student has summarized contributions of original and confirmatory nature, with scientific-applied and only applied nature. I believe that the proposed contributions have actually been defended in the presented work, but they also had to be more generalized and given in a more concise and synthesized form. They would support the theory and practice of operative dentistry, would contribute to the optimization of approaches related to proper photopolymerization.

Evaluation of publications related to the dissertation

3 full-text publications in Bulgarian journals and 3 participations in national regional scientific forums with international participation have been presented. In all of them, Dr. Georgiev is the first author with significant participation in the works. This fulfills the requirements regarding the publishing activity of the doctoral students. The presented works largely reflect the results of different stages in the research of the dissertation.

Abstract

The abstract has been made according to the requirements of MU Varna and in an abbreviated form presents the most important parts of the dissertation. It is written on 64 pages and illustrated with 21 figures and 12 tables and fully complies with the academic rules adopted in our country.

Critical notes

I believe that in the dissertation there should have been a clinical task that would verify the purely laboratory results, moreover, that the work has a strong practical and applied nature. This does not belittle the research conducted and the results achieved in this work. The doctoral student should perform this task in his future research, which would build on the results achieved in the presented work. I also recommend not to use loan-words as dimensions, but Bulgarian analogues.

Conclusion

The dissertation of Dr. Georgiev contains applied and scientifically applied results, which are original and comply with the Law for development of the academic staff in the Republic of Bulgaria (ZRASRB). The presented materials and results correspond to the requirements of MU - Varna for dissertation work. The scientific work shows that the free doctoral student Dr. Georgi Plamenov Georgiev has theoretical knowledge and practical professional skills in the scientific specialty of operative dentistry and demonstrates qualities and skills for independent research.

Based on all the above and the presented dissertation "Problems associated with photopolymerization in dentistry" and its original contributions, I propose and vote for Dr. Georgi Georgiev to be awarded the educational and scientific degree "Doctor" in the scientific specialty 03.03 .01 therapeutic dentistry.

06. 05. 2021

Prof. R. Vassileva

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