

STATEMENT

by Assoc. Prof. Dr. Emilia Karova, PhD
Department of Conservative Dentistry“, FDM, MU – Sofia
as an external member of the Scientific Jury

of a Doctoral thesis on
„Problems Associated with Photopolymerization in Dentistry“

for awarding the educational and scientific degree "Doctor"
in the scientific specialty "Therapeutic dental medicine"
professional field 7.2 Dental medicine
from the field of higher education 7. Healthcare and sports doctoral program

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Form of doctoral studies: Independent preparation

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The review was prepared in accordance with Order № P-109-115 / 31.03.2021 of the Rector of MU-Varna and Protocol № 1 / 09.04.2021 of the Scientific Jury.

General presentation of the procedure and the doctoral student

The set of materials presented on electronic media is in accordance with the requirements of the Law of the Development of the Academic Staff in the Republic of Bulgaria (LDASRB), the Regulations for application of LDASRB and the Regulations for the terms and conditions for acquiring scientific degrees and holding academic positions in MU - Varna and includes: Order № P-109-242 / 18.05.2018 for enrollment as a doctoral student on an independent preparation in the Department of Conservative Dentistry and Oral Pathology, FDM – Varna with scientific supervisors Prof. Dr. Vladimir Panov, D.Sc. And Prof. Eng. Tsanka Dikova, DSc.; transcript-extract from the Protocol №76/25.02.2021 of the Department council with a positive decision for readiness for defense; Order № P-109-115/31.03.2021 for the completion of the doctoral study with the right to defend the dissertation within a year; European CV format signed by the doctoral student; protocol from a successfully passed exam in the specialty; list of publications and participation in scientific forums related to the dissertation, signed by the doctoral student; copy of the Diploma for educational qualification degree "master"; a Doctoral thesis and printed abstract.

Dr. Georgi Georgiev was born in 1988 in the city of Varna. In 2007 he completed his secondary education in Varna, and in 2013 his higher education in FDM, MU - Varna. Since 2013 he has been working as a dentist in a dental practice in Varna, and since 2014 as an

Assistant Professor in the Department of Conservative Dentistry and Oral Pathology at the FDM - Varna.

He is involved in teaching Bulgarian and English students in pre-clinics and clinics of conservative dentistry. He speaks English fluently.

Characteristics of the structure of the dissertation

The dissertation of Dr. Georgi Georgiev is properly structured and has the necessary main sections of a dissertation, required by the Regulations on the terms and conditions for obtaining scientific degrees and holding academic positions at MU - Varna. It consists of 197 pages, distributed as follows: content 2 pages, abbreviations used 1 page, introduction 2 pages, literature review 44 pages, aim and tasks 1 page, material and methods 17 pages, results and discussion 81 pages, conclusion 2 pages, contributions - 2 pages, bibliography 17 pages, publications and participation in scientific forums - 1 page and 6 appendices.

The evidence material is illustrated with 24 tables and 45 figures. The bibliographic reference covers 178 literature sources, 4 of which in Cyrillic and 174 in Latin.

Relevance of the topic

The qualities of modern light-cured composites and the increased requirements of patients for fast and aesthetic restoration of the hard dental tissues defects are conditions leading to the widespread use of this type of restorative materials. The long-term results and prognosis of the treatment depend on a number of factors, one of which is the efficiency of photopolymerization.

The characteristics of LED light curing units and the possibility of using them for the polymerization of composites with different photoinitiator systems make them a universal and reliable source of light. Despite their undoubted advantages, the quality of the processes initiated by them depends on the light intensity, battery charge and time of use. Unfortunately, dentists still neglect the importance and need of knowledge on these factors, which undoubtedly affect the quality of treatment. The study of the impact of some of the characteristics of the LED light curing units on the efficiency of polymerization and the need to develop and recommend curing regimes for the most commonly used modern composites make the work relevant and useful for the clinical practice.

Knowledge of the problem - literature review

The literature review focuses on the topic of the dissertation and considers sequentially the composition and the main characteristics of the resin based composites and the problems related to their polymerization.

Factors influencing the polymerization shrinkage and ways to reduce them are analyzed.

A special place is given to the types of light curing units and their advantages and disadvantages are critically presented. A table comparing their characteristics makes it easier for the reader to perceive the information already described.

The factors influencing the polymerization efficiency are critically examined. Special attention is paid to the importance of light intensity and irradiation time, the distance and

direction of the light guide to the irradiated surface, as well as the properties of the composites used.

The author presents interesting data related to the low awareness of dentists of the characteristics, operation and maintenance of light curing units, as well as the ability to control the main factors of photopolymerization.

The review ends with an analysis of the literature data, which justifies the need for more in-depth research on the chosen topic and argues the aim and tasks of the dissertation.

Aim and tasks

The aim of the dissertation is to study the problems related to photopolymerization in dentistry by analyzing the factors influencing the process of photopolymerization of dental composites. On my opinion, the stated goal of the study should be more precise and better correspond to the set 4 tasks.

The planned experimental formulations make it possible to clarify the influence of light intensity, irradiation time and layer thickness of the composite on the hardness of the restoration and the efficiency of polymerization. It is also planned to develop and recommend modes of light curing of the studied dental composites.

Research methodology

The research material is sufficient in volume to obtain reliable results and conclusions. The dependence of the light intensity of wireless LED light curing units on the battery charge and the time of their use were established by studying 10 devices in the first task and 94 - in the second. The results were processed and statistically analyzed by using Microsoft Excel software.

Three types of resin based composites were used for the implementation of the third task - universal nanohybrid, nanohybrid bulk fill and universal nanophilic flowable material. The influence of the factors of photopolymerization - light intensity, irradiation time and thickness of the composite layer - on the hardness of these composites was studied by the Vickers method.

The last task of the scientific work was carried out through the software product MatLab. On the basis of regression models, a program has been developed, which allows to optimize the parameters of photopolymerization studied in the third task – based on given control factors (intensity and irradiation time), the hardness of the composite layer was calculated, depending on its thickness.

The applied methods are adequate to the set tasks and ensure objectivity and reliability of the obtained results. They were described in details in each of the tasks.

Characteristics and evaluation of the dissertation

The dissertation work was carried out personally by the doctoral student under the guidance of his scientific supervisors.

The results of the first task are presented descriptively and in the form of 3 figures and 1 table. It was found that in four of the studied light curing unit models the discharge of the battery leads to a decrease in light intensity and incomplete polymerization.

The data from the research on the second task show that the longer and more frequent use of light curing units reduces the intensity of the generated light, and in about 1/3 of the studied models it falls below the critical values. The results are summarized in 6 figures and 1 table.

The influence of the intensity and duration of light exposure, as well as the thickness of the layer on the hardness of the studied composites is presented in 18 figures and 3 tables.

The results of the regression analysis and the parameters calculated with the software program are presented in 5 figures and 5 tables. Tables with recommended light curing regimes for the three studied composites were developed.

The extensive description of the obtained results is followed by a short discussion and inadequate comparisons with the conclusions reached in the observations and experiments of other researchers and their team. The information from the presented extensive bibliographic references should be more skillfully used in analyzing the findings of the respondent.

Conclusions and recommendations

Each of the tasks ends with conclusions that correspond to the evidence material. The number of conclusions on the last two tasks should be reduced by systematizing the data obtained from the research.

The dissertation ends with a short conclusion, which summarizes the established patterns and conclusions.

Contributions

Dr. Georgiev divides the contributions of his scientific work into two groups - scientific-applied and applied. According to the first group, 7 contributions are original and 1 is confirmative. Impressive is the optimization by regression analysis of some of the factors influencing the efficiency of photopolymerization. Based on the specially designed software, optimal curing modes are recommended, with the intention to provide maximum hardness of the studied composites at a corresponding layer thickness.

The three applied contributions are original, as the three tables recommending regimes for light curing of the compared composites are of the greatest importance for dental practices.

Evaluation of dissertation publications

In addition to the developed dissertation, 3 publications have been presented, in which Dr. Georgiev is the first author. He also has taken part in 3 scientific forums, all in English. Their number is sufficient and meets the requirements of the Regulations on the terms and conditions for obtaining scientific degrees and holding academic positions at MU - Varna.

Abstract

The abstract corresponds to the content of the dissertation and is in accordance with the requirements adopted by MU – Varna. The aim, tasks, material, research methods and the obtained results are presented on 64 pages, using tables and color figures. Conclusions, contributions, publications and participation in scientific events associated with the dissertation are also included.

CONCLUSION

Dr. Georgi Plamenov Georgiev presents a contemporary dissertation with original applied results. Based on a completely sufficient volume of experimental material, he presents results and reaches conclusions that are useful for the practice of dentists.

The remarks made do not diminish the scientific value of the presented experimental studies. Taking into account the criteria for obtaining the educational and scientific degree "Doctor", specified in the Law for development of the academic staff, the Regulations for its application and the Regulations of MU - Varna, I rate positively the dissertation "Problems Associated with Photopolymerization in Dentistry" and I will vote Dr. Georgi Plamenov Georgiev to be awarded the educational and scientific degree "Doctor" in the scientific specialty 03.03.01 Therapeutic dental medicine.



Assoc. Prof. Emilia Karova, PhD