OPINION

From

Assoc. Prof. Dr. Maya Dimitrova Doichinova, PhD

Associate professor of Operative Dentistry and Endodontics in the Department of "Conservative Dentistry and Oral Pathology", FDM, MU-Varna, internal member of the scientific jury, according to order No. P-109-200/15.07.2024 of the Rector of MU-Varna.

Regarding: Dissertation work on the topic: "**Investigation of the influence of some factors on teeth whitening**" for the award of the educational and scientific degree "Doctor" in the scientific specialty "Therapeutic Dentistry", professional direction 7.2. Dentistry 7. Health care and sports.

Author: Dr. Silvia Evtimova Stankova, full-time doctoral student at the Department of "Conservative Dentistry and Oral Pathology" of the FDM, MU-Varna.

Scientific supervisor: Prof. Dr. Vladimir Panov, MD

The dissertation contains 190 standard pages and is illustrated with 30 tables, 94 figures and four appendices. In terms of structure, the proportional relationship between the main parts of the dissertation have been respected.

The literary reference consists of 424 sources, of which 23 are in Cyrillic and 401 are in Latin.

Literature review: The literature review begins with brief historical data and successively examines the main methods of teeth whitening, including the mechanism of whitening, methods of evaluating the whitening effect. The doctoral student pays attention to the influence of various physical and chemical agents on the whitening effect, as well as the possible adverse effects after whitening vital teeth. The literature review ends with conclusions that point to the presence of unresolved issues related to teeth whitening and motivation regarding the need for the dissertation work.

The formulated **Goal** has four appropriately selected tasks.

Materials: The material for all four tasks is sufficient, carefully selected according to strict criteria and correctly distributed. The processing methods are well thought out and scientifically sound. Statistical methods are precisely and skillfully selected for

processing the collected material.

Results and Discussion: The results for all four tasks have been thoroughly checked.

In the first task, the author investigates the attitude and experiences of dental doctors (DDM) and patients regarding teeth whitening methods. The conclusions that Dr. Stankova formulats, taking into account the results of the questionnaires, state that the most common clinical protocol among DDM for teeth whiting volves the application of whitening agent(WA) with a high concentration of HP in one visit with 2-3 applications of the whitening agent, with average duration of 15 min. The second conclusion regarding the survey among DDMs is that 80% of participants apply light activation of WA, and a little more than half of them are convinced that it accelerates and increases the whitening effect of the applied whitening substance. A large proportion of patients (95%) do not associate whitening procedures with a deterioration in their quality of life. The other finding is that a high percentage of individuals have never visited LDM for whitening, but the proportion of those individuals who would undergo dentist-prescribed whitening is high.

The second task is to investigate the influence of some physical activators on the rate of HP disintegration in teeth whitening products. The task is divided into two subtasks. The doctoral student proves that the differences established by iodometric titration between the actually reported concentration of HP in the studied IP and the expected one are within the permissible limits according to the ISO standard for IP for external IZ ISO 28399:2021. In addition, by iodometric titration, a gradual decrease, during 20 min, of the HP concentration in the IP samples without additional activation was found. The application of physical factors (blue light - 450 nm and electric current as activators of WA leads to an initial increase in the concentration of HP with a peak at the fifth minute, followed by a gradual decrease without reaching its initial values. The last conclusion summarizes the results regarding the achieved final whitening effect on black tea extract after application of WA without or with activation by blue light. Effect is equal, but occurs almost twice as fast after activation. Iontophoretic activation leads to a weaker but gradually occurring whitening effect.

The third task is dedicated to investigating the potential of metal salts and enzymes to activate teeth whitening products. The obtained and analyzed results give reasons for Dr. Stankova to formulate 4 conclusions. On the one hand, the concentration of HP in the WA has a major role in achieving the best whitening effect. On the other hand, horseradish peroxidase (HRP) to the greatest extent increases the whitening effect of 20% HP. Of the other salts and enzymes tested, ferrous sulfate (FS) and catalase (CBL)

appeared to have a similar effect on the bleaching effect of HP 20%, but weaker than that of horseradish peroxidase. The most important result, perhaps concerning the clinical situation of teeth whitening, is the fact that the addition of metal salts and oxidoreductase enzymes to IP with 20% HP causes a rapid and violent exothermic reaction, which in clinical conditions would pose a risk to the surrounding soft tissues and pulp vitality.

The fourth task represents a study of the morphology and roughness of the enamel of teeth that underwent bleaching in the third task. It becomes clear that the average tooth surface roughness (Ra) increases after whitening. Only in the group where the all-factory product with 35% HP was used did Ra decrease after bleaching and the percentage difference was negative. The percentage differences in Ra after administration of the different WAs were most significant in the catalase activator group and smallest in the horseradish peroxidase activator group. There is a negative correlation between Ra and the whitening effect achieved in the 20% HP group and the 20% HP and catalase activator group. However, the prepared correlograms lack a pronounced linear relationship between the two variables. For a more objective characterization of each examined surface, it is necessary that the measurement of the average surface roughness Ra is accompanied by a measurement of the average depth of roughness Rz. In all groups, Rsk values decrease significantly after bleaching and get even closer to 0, i.e. the distribution remains almost perfectly symmetrical at Rsk=0, and Rku values in all groups are below 3 or close to 3, which corresponds to normal profile height distribution.

Contributions: I consider the self-assessment of the contributions from the developed scientific work to be correct, which the author unites in 3 scientific-applied with original character, 4 scientific-applied with confirmatory character and 2 applied principles.

The dissertation work was carried out entirely by the doctoral student under the guidance of his scientific supervisor. In connection with his dissertation, the author has promoted his scientific developments in 3 full-text publications.

The abstract is properly structured, well-illustrated and corresponds to the individual parts of the development. I believe that it is presented in the appropriate volume required by the rules laid down in the Regulations for the Development of the Academic Staff of the University of Varna, as well as in proportion to the full volume of the scientific development.

There are no gaps in the documentation attached by Dr. Silvia Evtimova Stankova.

Conclusion: Dr. Silvia Evtimova Stankova's dissertation represents her own contribution to science. The scientific work, as well as the publications on the subject, show that the doctoral student has theoretical knowledge of the treated problem and skills for

independent research. The work is interdisciplinary, with a broad view of a large volume of issues. It is written meticulously and with a sense of detail, richly illustrated with figures and graphics. The results obtained and the conclusions drawn, as well as the methodologies, represent a scientific wealth on which many further developments, researches and studies can be based. Good professional skills, in-depth knowledge are evident throughout the entire course of scientific development, in which theoretical literary data, own results and their interpretation are arranged, and relevant conclusions are drawn. In these ways and in this sense, I consider that the set goal has been fulfilled. It is my opinion that Dr. Stankova and her dissertation have the necessary merits and deserve to be evaluated positively, and therefore, I will vote "Yes" for the awarding of the educational and scientific degree "Doctor" to Dr. Silvia Stankova. I recommend the members of the esteemed scientific jury to vote positively for awarding the educational and scientific degree "Doctor" to Dr. Silvia Evtimova Stankova in the scientific specialty "Therapeutic Dentistry".

10.09.2024,

Varna

Signature:

/Doc. Dr. Maya Doichinova,

MD/