

STATEMENT

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Regarding the dissertation submitted for the award of the educational and scientific degree "Doctor" in the scientific specialty of Obstetrics and Gynecology, Department of Obstetrics and Gynecology, Medical University –Varna.

Dissertation Title: *“CO₂ Laser Treatment in Urogynecological Conditions”*

Author: Dr. Darina Alexieva Davidova

The dissertation submitted for defense consists of 147 pages, including 86 figures and 1 table. A total of 202 literary sources are cited, of which 9 are by Bulgarian authors and 193 by foreign authors.

Relevance of the Topic

In her dissertation, Dr. Darina Davidova has addressed a highly relevant issue. CO₂ laser therapy provides opportunities for effective and minimally invasive treatment, potentially offering significant benefits to patients, including symptom relief and improved quality of life. While not life-threatening, urinary incontinence seriously impacts the quality of life for women and has substantial physical, psychological, social, and economic consequences. Laser therapy may serve as a conservative alternative for women seeking minimally invasive non-surgical treatment.

Brief Biography and Teaching Activity

Dr. Darina Davidova graduated from Plovdiv Medical University in 2013. She acquired a specialty in Obstetrics and Gynecology in 2018 at Sofia University. In 2020, Dr. Davidova began her academic career at Prof. Dr. Assen Zlatarov

University – Burgas. Currently, she is part of the specialist team at New Life Clinic in Burgas. She is proficient in English and has participated in numerous conferences, seminars, and training courses in her field.

Literature Review

The literature review clearly outlines the anatomical and physiological foundations of incontinence, its subtypes, diagnostic methods, and the possibilities for medical and surgical treatment. The candidate thoroughly discusses the continence mechanisms of the bladder and supporting structures, as well as the damaging factors that determine the types of incontinence. The structure of the CO₂ laser and its mechanism of inducing local tissue changes leading to therapeutic effects are described in detail.

Aim of the Dissertation

The objective of the dissertation is to evaluate the efficacy and clinical significance of CO₂ laser treatment in women with stress urinary incontinence (SUI) during reproductive and climacteric periods, while also analyzing the risks of side effects and complications.

The Main Tasks Include Eight Points:

1. To analyze the possibilities of CO₂ laser treatment for women with SUI in reproductive and climacteric periods.
2. To assess the quality of life in women with SUI.
3. To monitor the impact of treatment on the biomedical problems in women with SUI.
4. To evaluate the effect of treatment on the social and psychological issues in women with SUI.

5. To identify predictive markers of treatment success for specific patient profiles.
6. To analyze the results of CO₂ laser treatment in SUI.
7. To determine the continuity of treatment effectiveness with CO₂ laser vaginal procedures.
8. To prove the safety of CO₂ laser therapy in patients with UI.

Materials and Methods

A retrospective and prospective study was conducted on 107 female patients who presented for outpatient gynecological examination. The study covered a 2-year period (January 2022 – January 2024).

Patients were divided into three age groups: "18–40", "41–63", and "over 63". They were also categorized into four groups according to their BMI. A patient profile was created for each participant, outlining expectations from the treatment. Survey questionnaires were used to assess the potential and success rate of the procedure.

A control group of 27 women with urinary incontinence who underwent conventional surgical treatment was surveyed using the same questionnaire. These patients were aged 39–76, had UI symptoms for 1–17 years, and were diagnosed with cystocele not protruding past the hymenal ring under strain. They underwent classical anterior colporrhaphy.

Statistical Methods Used:

1. Descriptive analysis – frequency distribution in tabular format.
2. Variational analysis – mean values, standard deviation, representative error, and 95% confidence interval.
3. Frequency analysis of qualitative variables (nominal and ranked).

4. Graphical analysis – visual presentation using MS Excel 2016.
5. Hypothesis testing.
6. Regression analysis – 95% confidence interval, significance level $\alpha = 0.05$.

Own Results and Discussion

The application of CO₂ laser was found feasible in all three age groups. The laser was safe to use; however, treatment effectiveness dropped in more than half (66.6%) of patients with cystocele protruding beyond the introitus without strain. This finding can help avoid unnecessary time and cost for such patients. In patients without cystocele or with non-protruding cystocele, treatment was effective in over 70% of cases.

Survey results regarding side effects:

The comparative analysis confirmed the absence of economic loss for both patients and employers.

The share of women reporting symptom improvement (i.e., absence of sudden incontinence during the day) after surgery was 85.19%, compared to 97.2% after the third CO₂ laser procedure.

The effectiveness of CO₂ laser treatment was proven superior to the surgical method.

Conclusions and Contributions

Eleven conclusions and ten practical contributions were formulated—five original and five confirmatory.

Original Contributions:

1. First study in Bulgaria on outpatient, minimally invasive treatment of SUI without the need for anesthesia.
2. Identification of factors affecting the effectiveness of CO₂ laser therapy for UI and creation of patient profiles for successful treatment.
3. First national study on the impact of SUI on quality of life before and after CO₂ laser treatment versus classical surgical methods.
4. First study in Bulgaria on CO₂ laser treatment success rates in different age groups.
5. Achieved therapeutic results with CO₂ laser treatment in recurrent UI cases after failed conventional surgery.

Confirmatory Contributions:

1. Confirmed safety of CO₂ laser vaginal procedures across age groups compared to classical surgical treatment.
2. Established the need for objective cystocele assessment before CO₂ laser therapy.
3. Validated the possibility of treating UI with CO₂ laser even with overactive bladder, which is not a contraindication.
4. Demonstrated that outpatient CO₂ laser treatment does not require anesthesia.
5. Proved the method's efficacy and sustained results up to 6 months post-procedure.

Conclusion

The dissertation by Dr. Darina Davidova, titled "*CO₂ Laser Treatment in Urogynecological Conditions*," is timely and meets scientometric and academic development criteria set by the Medical University – Varna for awarding the degree "Doctor".

I recommend that the esteemed members of the Scientific Jury vote **in favor** of awarding the educational and scientific degree "**Doctor**" in the specialty "**Obstetrics and Gynecology**" to Dr. Darina Alexieva Davidova.

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