OPINION

by Prof. Svetla Vasileva Staykova, MD, PhD, DSc
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Subject: Awarding of the educational and scientific degree 'Doctor' to Dr. Magdalena Ivanova Bosheva, pursuant to the decision under Protocol No. 46 dated 29.09.2025 of the Faculty Council and Order No. R-109-402/01.10.2025 of the Rector of the Medical University – Varna, based on Art. 24, para. 6 and Art. 30, para. 3 of the Regulations for the Application of the Law for the Development of the Academic Staff in the Republic of Bulgaria, and Art. 68, para. 1 of the Rules for the Development of the Academic Staff at the Medical University – Varna, on the topic: 'Physical Activity in Hemodialysis Patients and Possibilities for Its Optimization.'

Biographical data and career development

Dr. Magdalena Bosheva graduated from the Faculty of Medicine, Medical University – Varna, in 2020. The same year, after a successful competition, she was appointed as a resident and assistant at the Clinic of Physical and Rehabilitation Medicine, University Hospital "St. Marina" – Varna. Since 2023, she has held a Master's degree in "Health Management and Medico-Social Care" and currently works in the Clinic of Physical and Rehabilitation Medicine, while also teaching at the Department of General Medicine, Medical University – Varna.
Her additional research fields include nephrology and dialysis, intradialytic exercise, kinesitherapy, kinesiology, and sleep medicine. She is a member of the Scientific Group for Early Childhood Development in the Neuroscience Division at NIMU, EURACT, BGSPMR, NYSPMR, the Bulgarian Nephrology Society, and the Union of Scientists – Varna.

Relevance of the research topic

Chronic kidney disease (CKD) is a major global health problem associated with reduced life expectancy. In patients with end-stage kidney disease (ESKD) undergoing hemodialysis (HD), survival is approximately 75% lower than that of their peers. These patients often suffer from a high degree of disability, resulting from CKD complications and sedentary lifestyles, which further limit their ability to perform daily activities. Over the years, renal rehabilitation has received insufficient attention. It is a coordinated, multifaceted intervention designed to optimize patients' physical, psychological, and social functioning. Renal rehabilitation is an effective, feasible, and safe strategy for the

secondary prevention of CKD-related cardiovascular and metabolic complications. Dr. Bosheva conducted a detailed and systematic study in patients with CKD stages G1–G5, demonstrating that specialized intradialytic kinesitherapy significantly improves physical activity, social rehabilitation, and quality of life. Future efforts should focus on the effects of rehabilitation and exercise programs, which remain insufficiently explored, including cardiovascular and pulmonary rehabilitation. The new rehabilitation concept aims to 'add life to years and years to life' for CKD patients.

Literature awareness

Physical activity is of utmost importance for patients at all stages of CKD. An appropriate method for improving low physical activity in ESKD patients is the introduction of intradialytic exercise using a bicycle ergometer mounted to the dialysis chair or bed. The doctoral candidate presents a precise and detailed literature review addressing key data on aerobic exercises using specially designed ergometers that improve circulation, muscle tone, and endurance, while reducing fatigue and muscle cramps occurring at the end of dialysis sessions. These measures help prevent muscle mass loss and malnutrition, thereby improving quality of life and mental well-being.
The main goal of Dr. Bosheva's dissertation is clear and specific: cardio-cycle exercises have the potential to improve bone–mineral status, as measured by calcium/phosphate metabolism parameters, and enhance quality of life in chronic dialysis patients. Patient awareness about CKD increases through specialized health education provided by medical professionals. To achieve this goal, five specific objectives were formulated and successfully fulfilled in logical sequence.

Evaluation of materials and methods

The study participants were CKD patients treated between 2023 and 2024 at the Dialysis Center of University Hospital "St. Marina" – Varna. A total of 81 patients (47 men and 34 women) with ESKD were included—representing 45% of all dialysis-treated patients during the period May 2023 – November 2024. The experimental group comprised 42 patients and the control group 39 patients.
The exercise device used in this study was a specialized bicycle produced by the Danish company LEMCO MOBILITY, which designs high-performance training equipment for hospital use by dialysis, physically impaired, and neurologically affected patients. Statistical analysis included descriptive, variational, and alternative analyses. Parametric and non-parametric methods were applied for hypothesis testing.

Results and discussion

The main part of the dissertation presents original research, focusing on: the influence of HD treatment on physical activity and quality of life (KDQOL-SF questionnaire); the impact of specialized cardio-cycle exercises on clinical and laboratory parameters of bone–mineral disorders; the six-minute walk test (6MWT); and prevention of CKD complications, disease management, and rehabilitation.

The discussion is well-structured, clear, and aligned with the obtained data, compared to relevant international studies. The experimental group showed systematic clinical improvement: the percentage of patients without muscle pain increased from 19% to 33% (p=0.02), with no significant change in the control group. The proportion of patients limiting professional or social activities decreased from 78.6% to 71.4% (p=0.046), while remaining unchanged in controls (p=0.223). A remarkable finding was the increase in self-reported happiness—from 54.8% to 76.2% (p=0.002) in the experimental group versus one-third in the control group.
The creation of an original algorithm for implementing intradialytic exercises in clinical practice represents a significant contribution to CKD complication prevention, rehabilitation, and quality of life improvement.
Based on the obtained results, seven key conclusions were formulated, logical and well-grounded, corresponding to the goals and results.

Scientific contributions

The following are of national significance and accepted as priority contributions:
1. Application of aerobic intradialytic exercise using a specialized bicycle for chronic hemodialysis patients.
2. Development of a diagnostic and monitoring algorithm including laboratory and functional assessments for CKD-MBD patients.
3. Creation and clinical implementation of an original protocol for intradialytic exercise, aimed at complication prevention, improved disease management, rehabilitation, and enhanced quality of life in ESKD patients.

Scientometric indicators

The doctoral candidate provides a list of four publications related to the dissertation, three of which she authored as first author. The list fully meets the requirements for obtaining the PhD degree at the Medical University – Varna. She has 28 scientific papers and 9 citations of her works.
The dissertation and the abstract demonstrate depth, coherence, and precise presentation of the research. The abstract is stylistically correct, well-illustrated, and faithfully reflects the essence of the dissertation.

Conclusion

I consider the dissertation of Dr. Magdalena Bosheva a relevant and significant scientific work of high practical importance. The presented research contains original and applicable contributions that are the author's own work.
Based on the above, I strongly recommend that the members of the Scientific Jury vote positively for awarding the educational and scientific degree "Doctor" to Dr. Magdalena Bosheva.

21 October 2025

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