REVIEW

by Prof. Dr. Plamen Kinov, PhD

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Subject:

Dissertation for the award of the scientific degree 'Doctor of Science'

Professional field 7.1. Medicine

doctoral program Rheumatology

Author: Dr. Elena Kirilova Kirilova, PhD

Department: Propaedeutics of Internal Medicine, Medical University of Plovdiv

Topic: "Development of a specific national model for predicting osteoporotic fracture risk and assessment of bone mineral density of axial skeleton with radiofrequency echographic multi spectrometry (REMS)"

1. General presentation of the procedure and the candidate

The presented set of materials on paper and electronic media is in accordance with the Law for the development of the academic staff of the Republic of Bulgaria, the Regulations of this law for application in the Republic of Bulgaria and the Regulations for academic development in MU - Plovdiv.

The minimum requirements for the acquisition of the scientific degree "Doctor of Science" by the candidate are met, as follows with the presented total number of points by groups of indicators:

Group of indicators	Requirement for Doctor of Science according to regulations	Fulfilled points for Doctor of Science
A dissertation, Ph.D.	50	50
Б	-	-
B (published monograph) Indicator 3	100	100
Г-publications and reports	100	262,5
Д - citations	150	230
Total points	400	642,5

2. Brief biographical data about the candidate

Dr. Elena Kirilova was born on March 26, 1991 in the city of Plovdiv. She graduated from the Medical faculty of Thrakia University, Stara Zagora in 2016.

Dr. Kirilova did her one-year undergraduate internship at the University Hospital at the Medical Faculty of the Carl Gustav Carus University in Dresden, Germany and subsequently a clinical specialization in the Stem Cell Transplantation Department. There she was enrolled as a doctoral student with successful defense of a dissertation in 2018 with the acquisition of ONS "Doctor" with a grade of "Magna cum laude".

Since 2018 she has been an assistant at the Faculty of Medicine and the Faculty of Health Care of the University "Prof. Dr. Asen Zlatarov "- Burgas and conducts lecture courses in Internal Medicine and Geriatrics.

Dr. Kirilova began her clinical practice in Rheumatology. Therefore, her scientific activity is mainly related to diseases of the musculoskeletal system - specifically to osteoporosis. The completed specialization in Rheumatology allows Dr. Kirilova to gather the necessary

experience and number of patients for diagnosis, processing and analysis of clinical data on the selected topic of the dissertation presented for defense.

During her specialization, Dr. Kirilova has completed prestigious international postgraduate training in the field of intra-articular treatment, joint ultrasound, osteodensitometry, including DEXA and REMS. In December 2020, the University Base in Burgas, managed by Dr. Kirilova, was recognized as the World University Reference Center for REMS. Since 2019 she has been leading a biomechanics class at the University "Prof. Dr. Asen Zlatarov "-Burgas.

3. Topicality of the topic and expediency of the set goals and tasks

Osteoporosis is a socially significant disease with an increasing prevalence due to the tendency of society to age. It is a progressive and often disabling disease, as it is associated with increased fracture risk, poor quality of life and increased mortality. For this reason, predicting the risk of future fractures, including the creation of models for fracture risk assessment are extremely relevant and useful for assessing therapy. Dr. Kirilova's participation in the creation of the national FRAX model, which is globally recognized and included in a number of manuals, is a testimony to the relevance of her chosen topic. In addition, Dr. Kirilova applied for the first time in Bulgaria the innovative radiofrequency echographic multi spectrometry (REMS) - an ultrasound examination to assess the BMD_{US} of the axial skeleton. The models developed with this methodology are useful for future assessments of the need for this study. In general, I believe that Dr. Kirilova has presented results on two extremely innovative and current topics - FRAX and REMS, through which the individual assessment of fracture risk is possible for every Bulgarian anywhere in the world.

4. Knowledge of the problem

Dr. Kirilova presents an excellent awareness of the problem, presenting the situation so far worldwide and in Bulgaria. The literature review is comprehensive and is written on 54 pages. 478 scientific sources were used, of which 8 are in Cyrillic and the remaining 470 - in Latin. The dissertation has analyzed and summarized the existing literature in a very understandable way.

5. Research methodology

The statistical processing is done with the reliable statistical program SPSS version 19 as the processing of the results gives an answer to the set tasks and allows reaching the main conclusions. The frequency of femoral fractures in the Stara Zagora region within the period between 2015-2017 was studied, and osteodensitometry of the axial skeleton was performed in 324 women with the innovative REMS technology. The scientific methods used are presented in detail.

6. Characteristics and evaluation of the dissertation

The dissertation is written on 225 standard pages. It is structured according to the requirements and is illustrated with 8 tables, 27 figures and 14 appendices. It includes an introduction (1 page), a literature review (54 pages), a bibliography (54 pages with 478 literature sources, of which 8 are in Cyrillic and the rest in Latin). The author shows a very good literary awareness of the developed problem.

The main goal of scientific work is clearly defined. The research in the dissertation is also subordinated to it. The tasks are formulated precisely and correspond to the set goal.

The material of the research, the methodology, their own results, their analysis, as well as their own conclusions and contributions are considered sequentially. 324 patients who underwent a REMS study were assessed.

The results are well illustrated in tables and figures. Illustrate the importance of the evaluation methods used.

In the chapter "Discussion" on 23 pages an extensive analysis of the results of the dissertation on the subject and a comparison with those of other authors who worked on the problem. The author's results are compared with the data from the literature and are correctly described.

The dissertation ends with 11 conclusions, which I agree with and which in summary confirm the results of the research.

7. Contributions and significance of the development for science and practice

The dissertation contains results that are original, with practical application and represent a significant contribution to science. I accept the formulated contributions, which accurately present the results obtained. The most significant contributions are the epidemiological study of femoral fracture risk, the development of a specific national model for predicting osteoporotic fracture risk, valid for the Bulgarian population, the prediction of lifelong fracture risk among the Bulgarian population and the assessment of risk factors which affect the BMD_{US} of the axial skeleton, measured by REMS.

8. Evaluation of the dissertation publications

The presented publications to the dissertation are of high quality, published in authoritative foreign and Bulgarian scientific journals.

Dr. Kirilova has presented 19 publications, 15 of which are in full text and 4 reports in foreign journals. Of these, 10 are referred to in Scopus (WoS) and 8 are with IF (Total IF 48,821).

The citations in refereed and indexed editions of Scopus / WoS / are 12, 4 of them are with IF and 10 citations are in non-refereed journals with scientific review.

As the first author Dr. Kirilova is in 15 publications, and as a second author - in 4 publications. This shows the leading scientific role and significant contribution.

9. Personal participation of the candidate

Some of the tests performed are in a team, but osteodensitometry with REMS was performed personally by Dr. Kirilova. The assessment of personal contribution can also be made by the fact that in the presented publications she is a leading and representing author.

10. Abstract

The abstract has a total volume of 64 pages with 8 tables and 22 figures. It also contains a list of publications.

CONCLUSION

Dr. Kirilova presents her work on creating a model of FRAX for Bulgaria, as well as the innovative methodology REMS osteodensitometry of the axial skeleton with some of the first data on the Bulgarian population and the world.

The dissertation contains scientific, scientific-applied and applied results, which represent an original contribution to science and meet all the requirements of ZRASRB, the Regulations for application of ZRASRB and the Regulations for academic development in MU - Plovdiv. The presented materials and scientific results fully comply with the specific requirements of MU - Plovdiv.

Due to the above, I confidently give my positive assessment of the peer-reviewed dissertation and propose to the esteemed scientific jury to award the degree of 'Doctor of Science' in the doctoral program in Rheumatology to Dr. Elena Kirilova Kirilova.

16/05/2021

Reviewer:

Prof. Dr. Plamen Kinov, PhD