To the Chairman of the Scientific Jury,
determined by Order No. R-109-35/07.02.2024
of the Rector of the MU - Varna

REVIEW

by

Prof. Zlatka Borisova Stoyneva-Paskaleva, MD, PhD
Medical faculty (MF) - "St. Cl. Ohridski" Sofia university and MF - Medical university (MU) - Plovdiv, member of the Scientific Jury according to Order No. R-109-35/07.02.2024 of the Rector of MU - Varna and on the basis of Protocol No. 1/19.02.2024 of

the dissertation

for awarding the educational and scientific degree "**Doctor**"
in the field of higher education 7. "Health and sport", professional direction 7.1. "Medicine", scientific specialty "Occupational diseases"

Author: Dr. Dimitrinka Rosenova Dimitrova
Form of doctoral studies: full-time
Scientific organization: MU "Prof. Dr. Paraskev Stoyanov" – Varna
Topic: Occupational risk factors in the epidemiology of cerebral strokes
Scientific supervisor: Prof. Dr. Veselinka Dimitrova Nestorova, MD, PhD

I. Defense Procedure

The presented set of documents is in accordance with the Regulations for the acquisition of the general educational and scientific degree "Doctor" at the MU - Varna.

Dr. Dimitrinka Rosenova Dimitrova has gone through all the procedures stipulated in the Regulations for the Development of the Academic Staff of the MU "Prof. Dr. Paraskev Stoyanov" - Varna. Protocol No. 3/23.01.2024 of the Departmental Council of the Department of Optometry and Occupational Diseases at the MU Varna were presented, at which a decision was made to expel the full-time doctoral student Dr. Dimitrinka Rosenova Dimitrova with the right to defense. By Order No. R-109-35/07.02.2024 of the Rector of the MU - Varna on the basis of a report with In. No. 102-287/23.01.2024 by Prof. Dr. Zornitsa Ivanova Zlatarova-Angelova, MD - Head of the Department of Optometry and Occupational Diseases, with a decision according to Protocol No. 218/01.02.2024 of the Faculty Council and Report with In. No. 104-133/05.02.2024 by Prof. Antonia Slavcheva Dimova-Yordanova, MD - Dean of the Faculty of "Public Health" at the MU "Prof. Dr. Paraskev Stoyanov" - Varna, on the basis of Art. 24, Para. 6 and Art. 30, Para. 3 of the Regulations for the Implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria, Art. 68, Para. 1 of the Rules for the Development of the Academic Staff in the MU - Varna is charged with the right to defense, Dr. Dimitrinka Rosenova Dimitrova - a full-time doctoral student in the doctoral program "Occupational Diseases", professional direction 7.1 Medicine, enrolled with Order No. R-109-46 /31.01.2020.

Copies of the Protocols of 12.04.2021 in implementation of Order No. P-109-127/05.04.2021 of the Rector of the MU - Varna regarding the successfully passed exam to meet the doctoral minimum in the specialty "Occupational Diseases" and a foreign language on the Blackboard platform with proficiency at a minimum level of B1 (CEFR) for a doctoral minimum according to Order No. P-100-30/ 19.01.2021, amended by Order No. P-100-296/ 18.05.2021.

Dr. Rosenova has the mandatory registered profiles in ORCID with ID: https://orcid.org/my-orcid?orcid=0000-0002-8169-8898 and in Google Scholar with ID: https://scholar.google.com/citations?user=nqB5F8wAAAAJ&hl=bg, as well as in the scientific database - Researchgate with ID: https://www.researchgate.net/profile/Dimitrinka-Rosenova-2/research

Information cards have been created in the register of the National Center for Information and Documentation in Bulgarian and English (on electronic media - flash memory) in Word.
She has attached 3 publications and 6 participations in scientific forums related to the topic of her dissertation work, which meets the required number of qualitative and quantitative criteria defined in the Regulations for the Development of the Academic Staff in the MU - Varna.

II. Brief Biographical Data and Career Development

Dr. Dimitrinka Rosenova Dimitrova was born in 1989 in the town of General Toshevo, where she completed her secondary education in 2008. In 2015, she graduated from the MU - Varna with a master's degree in the specialty "Medicine" (Higher Diploma education qualification master's degree, MUV Series No. 003483, Reg. No. 003534/11.11.2015).
In her quest for professional growth and development, Dr. Rosenova acquired a specialty in "Nervous Diseases" in 2021. She participated in qualifying thematic courses for postgraduate studies: Pedagogical competence; Legal framework regulating the education of doctoral students; Research methodology; Research ethics; Statistical methods for data processing and presentation; Communication techniques and presentation skills, etc.
Dr. Rosenova's professional career began in November 2015 as a resident physician at the Emergency Department of the "St. Anna" - the city of Varna, where she worked until July 2016. In August 2016, she was appointed as a specialty doctor in the Second Neurological Clinic of UMHAT "St. Marina" - Varna. Her academic career began in 2020, when, after winning a competition, she became a full-time doctoral student in the doctoral program "Occupational Diseases" at the Department of Occupational Diseases, Department of Optometry and Occupational Diseases, MU-Varna, in professional direction 7.1 Medicine.
Her main professional and scientific interests are in the field of cerebrovascular diseases, neuroinflammatory and demyelinating diseases of the nervous system, electromyography and occupational nerve injuries.
Ms Rosenova, MD is fluent in written and spoken English.
She is a member of the Bulgarian Medical Union and the Bulgarian Society of Neurology.

III. Publications and Scientific Activity

Ms Rosenova, MD is the author of 3 full-text scientific publications, of which 2 in Bulgarian periodicals and 1 in a foreign publication on the problem of her dissertation work. She is the lead author of 1 of the publications and the third author of 2 of them, which testifies to her role in conducting the research, preparing the publications and presenting the scientific results in the scientific articles. The publications are in 2022 and 2023 and reflect the topicality of the subject.
Also attached are 6 dissertation-related active participations in scientific forums, 1 of which is in a national congress with international participation, 2 - in a jubilee scientific conference, 1 - in an international conference, 1 - in a Bulgarian medical forum and 1 - in a foreign medical journal, in 1 of which she is the lead author, in 2 she is the second author, in 1 - consecutive 3rd author and in 2 of them - consecutive 4th author.

IV. Structure of the Dissertation

The dissertation submitted for review is logically structured and complies with the accepted standards of a dissertation for obtaining the scientific degree "Doctor". It is developed in a volume of 87 standard pages, contains 17 figures, 17 tables and 3 appendices, including: table of contents (2 pages), abbreviations (2 pages), topicality of the problem (1/2 page), literature review (28 pages), aims and tasks (2/3 pages), working hypotheses (1/3 pages), material and methods (4 pages), own results (20 pages), discussion (7 pages), conclusion (1 p.), conclusions (1 p.), contributions (1 p.), literature (11 p.), publications related to the dissertation work and participation in scientific forums (1 p.) and 3 appendices (7 p.).

The bibliographic reference contains 156 sources, of which 3 in Cyrillic and 153 in Latin, quite up-to-date considering that about 80% of the cited sources are from the last decade.

V. Evaluation of the Relevance of the Dissertation Work

The significance of the presented dissertation work is predetermined by the choice of the topic of the role of occupational risk factors in the epidemiology of brain strokes. Cerebrovascular diseases are socially significant, among the leading causes of disability and mortality, but also with increasing morbidity, prevalence and mortality in our country and worldwide. Over the past 30 years, there has been a 70% increase in strokes with a 43% mortality rate, prompting the World Stroke Organization to call it the "epidemic of the 21st century". It increasingly appears at a relatively young age (before 50 years), which undoubtedly has a negative impact on socio-economic development due to affecting people in their most active working age. Bulgaria is among the leaders in morbidity and mortality from cerebrovascular diseases in the world. That is why studies on the role of not only the generally accepted main and contributing uncontrollable and controllable cerebrovascular risk factors, but also to re-evaluate the influence of occupational hazards and factors of the work environment and work process are innovative, current and important for successful prevention, early diagnosis and adequate control of acute cerebrovascular disorders as a significant modern problem.
Undoubtedly, the problem developed in the dissertation work is relevant and significant in scientific-theoretical and scientific-applied terms.

VI. Literature Review

In the literature review, Dr. Rosenova critically and thoroughly studied the main essential documentary sources related to the topic, systematized and synthesized analytically and summarized the scientific information on the problem, deriving and indicating the areas of necessary additional research. The presentation is characterized by logical consistency and sufficient concreteness in the presentation of the published foreign experience on the risk factors for the occurrence of acute cerebrovascular disorders and the resulting impaired quality of life of patients. Insufficiently clarified aspects and still controversial issues are highlighted mainly in relation to stroke risk factors, including insufficiently studied occupational hazards (stress and factors of the work environment and work process such as heavy metals, organic pollutants, plastics, silicon dioxide, mental or physical work, repetitive activities, static and dynamic physical load, changed mode of work, work mostly indoors or outdoors, work rate) affecting the epidemiology of cerebral strokes. The socio-economic significance of cerebrovascular disease is emphasized, especially due to its increasing relative share among the working-age population at risk of disability for the rest of life and the resulting need to clarify the role and occupational risk factors. The main share of the cited sources are from the last decade.
The overview presents the author as a well-informed researcher who knows the essence of the problem, analyzes and evaluates creatively and critically available literary sources, summarizes information and presents unclear questions. This allows her to formulate, in accordance with modern scientific research in this direction, a clear scientifically based **aims** of her work, namely: "To study the role of occupational risk factors in the epidemiology of brain strokes in patients of working age."
The tasks are specific and realistic, well defined and adequate to the set aims, namely: to identify stroke patients of working age through the analysis of imaging and laboratory studies; to specify the risk factors for cerebrovascular disease - gender, age, accompanying diseases, harmful habits and study the risk factors of the work environment and the work process associated with cerebrovascular diseases, incl. mental and physical work, professional stress.
Three working hypotheses have been logically derived for the relationship between over 30 years of total work experience and the risk of stroke; for a higher risk in workers with mainly physical labor and in patients with harmful habits (smoking and alcohol consumption).

VII. Material and Methods

The study included 351 working-age acute stroke patients between 18 and 64 years of age. Based on: a questionnaire filled out by the patients, anamnesis taken, physical and neurological status, the following risk factors were analyzed: non-modifiable - age and sex; modifiable - hypertensive disease, diabetes mellitus, rhythm-conduction disorders, chronic heart failure, ischemic heart disease, other heart diseases, dyslipidemia; behavioral - smoking and alcohol use; professional - total length of service, profession, weight, stress, work posture, work movements, work and rest regime, microclimate, mechanical fluctuations (vibrations, noise), dust, chemical hazards, stress. All patients underwent clinical laboratory tests, CT and/or MRI, and applied scales for assessing the level of consciousness - Glasgow-Liege Coma Scale (GLCS) and for the severity of the stroke - National Institute of Health Stroke Scale (NIHSS).

The applied complex of research methods allows to achieve the aims and obtain an adequate answer to the tasks set in the dissertation work.

VIII. Main Results and Contributions of the Dissertation Work

The results are correctly described, systematized, structured, well illustrated and meet the tasks set.

The obtained data were processed using modern statistical methods for a full and reliable evaluation of the data and successfully analyzed according to the formulated hypotheses.

A significantly higher frequencies of male stroke patients (68.9%) and patients between 52-64 years of age were found.

Through an analysis of the vascular risk profile of the patients, a high frequencies of arterial hypertension, dyslipidemia, diabetes mellitus, heart failure, ischemic heart disease and atrial fibrillation were registered, with the stroke having a directly proportional correlation dependence with the concomitant dyslipidemia ($p=0.001$).

In the studied contingent, stroke was statistically significantly more often manifested among patients with longer working experience (>30 years), also associated with age.

The study indicated that the incidence of stroke was significantly higher in patients with harmful habits such as smoking ($p\leq0.05$) and alcohol use ($p\leq0.02$), and in those with "mostly physical work", with work "indoors", with a dynamic working posture, with uniform movements and lack of a norm for performance in the working conditions.

No significant influence of the length of the working day, stress and work mode was found among the studied contingent.

A trend toward a decrease in NIHSS scores at discharge relative to admission indicates improvement in functional deficits and corresponds to a better prognosis with potential for long-term recovery.

In the discussion of the results of the study, Dr. Rosenova critically compares her own results with those in contemporary specialized literary sources, highlighting the novelties, analyzing the differences and indicating the corroborating data established in her dissertation work.

In conclusion, the most important results of the study on the role of modifiable and non-modifiable the disease, demographic, social, vascular and occupational risk factors for cerebrovascular morbidity among patients of working age are summarized, with an emphasis on length of work experience and indoor work and reliable correlations between work factors ("mainly physical work", dynamic work posture, monotonous movements, lack of work norm) and stroke.

Six clearly formulated conclusions have been synthesized, which accurately reflect the results of the conducted research and correspond to the set aims and objectives.

I accept the scientific-theoretical and scientific-practical contributions made by the doctoral student herself - for the first time in our country an in-depth study was conducted on the influence of occupational factors on the epidemiology of stroke in patients of working age; the relationship between levels of occupational stress and acute disorders of cerebral circulation was analyzed more thoroughly; the degree of recovery of the functional deficit after the acute stroke was analyzed by comparing it before hospitalization with that after discharge of the studied patients.

Of a confirmatory nature are: the role of the vascular risk factor - dyslipidemia and the demographic risk factors - age and gender, in increasing the frequency of stroke; higher frequency of stroke with longer working experience, with mostly physical work, monotonous movements, dynamic work posture and lack of work norm.
The scientific hypotheses, defined tasks and summaries of the results obtained in the dissertation are original and authentic.
The research and the written thesis are the doctoral student's own work.
There is a logical and meaningful connection between the individual parts of the dissertation.
The style of the dissertation is concise, clear, understandable and analytical.
The literature sources are arranged and numbered according to the requirements of the editors of the scientific medical journals (the so-called "Vancouver" style), and the references are indicated by Arabic numerals.
The abstract is structured in accordance with the requirements, and its content fully corresponds to the dissertation work. Illustrated with 16 tables, 17 figures and 3 appendices.

VIII. Critical Notes and Recommendations

The minimal omissions and errors in the citation of the literary sources and the list of the literature used do not violate the merits of Dr. Rosenova's dissertation work.
The PhD student could continue her research among more stroke patients and prepare publications on this interesting and current problem in international scientific journals, referenced and indexed in world-renowned databases of scientific information.

IX. Conclusion

The dissertation work of Dr. Dimitrinka Rosenova Dimitrova is on a hot topic not only for our country, about the association of cerebral stroke with occupational hazards and factors of the working environment and the labor process, with the non-modifiable and modifiable vascular risk factors, it was developed in depth and comprehensively, it presents scientific and scientific-applied results and conclusions with an original contribution to science and meets all the requirements of the Law on the Development of the Academic Staff in the Republic of Bulgaria, the Regulations for the implementation of the Law on the Development of the Academic Staff in the Republic of Bulgaria and the Regulations for the Development of the Academic Staff in Medical University - Varna.
The dissertation work shows that the doctoral student Dr. Dimitrinka Rosenova Dimitrova possesses in-depth theoretical knowledge and professional qualities and skills for independent conduct of scientific research.
All this gives me sufficient reason to confidently give my **positive assessment** of the peer-reviewed dissertation work and to suggest to the respected members of the respected Scientific Jury to give their **positive vote** for awarding Dr. Dimitrinka Rosenova Dimitrova an educational and scientific degree "Doctor" in the field of higher education 7. "Healthcare and sport", professional direction 7.1. "Medicine", scientific specialty "Occupational diseases" at Medical University "Prof. Dr. Paraskev Stoyanov" - Varna.

03/05/2024

Prepared the review:
Prof. Dr. Zlatka Stoyneva-Paskaleva, MD,
member of the Scientific Jury