

OPINION

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Regarding Doctoral Dissertation Defense of
Simona Bogdanova-Petrova MD

In Medical University "Prof. Paraskev Stoyanov" - Varna

On the topic: **" Pain as part of the rheumatological manifestations of the
COVID-19 virus infection"**

Scientific Supervisor : Assoc.Prof. Tanya Shivaheva MD, PhD

By the order of the Rector of the Medical University – Varna № P-109-198/16.03.2023r..

I have been appointed to prepare an opinion on the above-mentioned topic /as an internal member of the jury/ for the acquisition of an educational and scientific degree "Doctor" by Simona Bogdanova-Petrova MD.

1. Significance of the topic and formulation of the goal and tasks:

The new pandemic - COVID-19, caused by the SARS-CoV-2 virus challenged everyone in 2020. Originally considered to be a flu-like disease, the disease is now perceived as a polysyndromic inflammatory one, involving not only the respiratory system, but also the musculoskeletal system, the cardiovascular system, the skin, the urinary and nervous systems, it is accompanied by a number of hematological, gastrohepatoenterological, endocrine and mental symptoms. Many pain syndromes are also present in the heterogeneous nature of the disease. On the other hand, the pandemic dimensions, the information related to the course of the disease, the occurring complications, high death rate, imposed prolonged isolation, led to fear, anxiety and depression in large groups of the population. The assessment of anxiety and depression in patients suffering from COVID-19, especially with co-morbidities and in the elderly, gives the overall picture of the disease. The topic of the study is current and of scientific and applied-practical importance.

The purpose of the research is clearly and adequately formulated, arising naturally from the literature review. It examines the influence of inflammatory markers and the severity of anxiety and depressive symptoms on pain. The set tasks are 5 in number. They are correctly worded and meet the purpose of the study.

2. Structure of the dissertation:

The dissertation has a classic structure. Presented in a volume of 127 pages and a 33-page bibliography containing 419 titles. The data presented in the content is illustrated by 9 graphs, 20 figures and 53 tables. It contains the following sections: Introduction, Literature review, Aim, Tasks and Hypotheses, Material and methods, Results and discussion, Analysis and interpretation of own results and those from the literature, Conclusions, Contributions, Limitations of the study and Appendix - where the assessment tools for anxiety, depression and pain are presented. The proportions between the individual sections of the work are respected. Each of the parts of the dissertation work follows the logic of the set goals and objectives. Conclusions derive from own results, literature data, statistical data processing and discussions.

3. Literary awareness of the author:

The bibliographic reference includes 419 literary sources, most of them from recent years, given the nature of the work. There are no literary sources in Cyrillic.

The literature review presents an in-depth analysis of current literature data on the problem. Despite the huge scientific interest that has been caused by COVID-19 in the last few years, the literature data directly related to the topic of the dissertation is fragmented.

4. Methodology and design of the scientific research:

364 patients over the age of 18 were included in this scientific study. 234 of them had a diagnosis of COVID-19 and new-onset musculoskeletal pain during the acute phase of COVID-19, and 130 patients had chronic pain because of inflammatory joint diseases undergoing anticytokine drug therapy. The participants are recruited for a period of about 8 months - from April to December 2022. The patients included in the study were selected with well-formed criteria. The research methods selected are appropriate for the study objectives. The data collected during the research were processed using appropriate statistical methods.

The research methods chosen by the author and the collected material have allowed the achievement of the set goal, and the tasks set to be solved have received an adequate response.

5. Correspondence between objective, obtained results and conclusions:

There is a logical correspondence between the set objective, the obtained results, the discussion and the conclusions drawn. Own results and discussion are set out in 64 pages and illustrated with tables and graphs. Following the progress of the set tasks, the relationships between pain

phenomena in patients with COVID-19, inflammatory indicators and the assessment of anxiety and depression are clearly and in detail presented.

In the analysis of the obtained own results, the work was done correctly and competently, the necessary requirements for similar studies were met. The PhD student used a clear and precise presentation style. The obtained results have an original character, given the study of a newly emerging disease and possible significant cultural features in different populations.

The results clearly show that patients with moderate to severe COVID-19 experience joint and muscle pain. The established strength of muscle and joint pain, by means of average VAS values, is significantly above the generally accepted norm of up to 4 mm and can be defined as "moderate" pain. Musculoskeletal pain in patients with COVID-19 is largely determined by the psycho-emotional attitudes of the patients, and the degree of anxiety and depression directly and significantly correlates with the strength of the pain. The combination of the two indicators – anxiety and depression largely determine the variation of musculoskeletal pain. These results are similar to previous research on the influence of mood disorders on pain intensity in other diseases.

The role of the messages in the various information channels, which caused fear and anxiety among large groups of the population, through delivery of divergent and not always reliable information, was also evaluated. In the pandemic situation, the overall attitude of people changes and this reflects on the experience of pain. Such conditions were not observed far back in the past. Some local and culturally specific features of these attitudes are also possible.

The performed cluster analysis allows the formation of a subgroup of patients with COVID-19 treated in inpatient settings, who need specific psychological interventions or psychiatric treatment. The presence of social support in this group further supports their treatment process. Leading in the formation of this subgroup are the assessments of depressive and anxiety symptoms, the assessment of joint and muscle pain and the age of the patients. The results showed that a this subgroup of the patients with COVID-19 constituted almost half of the entire sample.

The study of mood disorders and pain intensity can be applied as a screening method in the studied population and allows the formation of the so-called the "risk group" - polymorbid, elderly, with severe COVID-19 patients, and can provide them with early interventions regarding their mental state.

The analysis of the results obtained from the assessment of inflammatory markers, anxiety and depression, as well as pain allow to examine and describe the specific relationships between

somatic symptoms and the psychological aspects of fear, anxiety and depression in a psychosomatic context.

These conclusions derive directly from the set goal and the results obtained in the course of the conducted research.

6. Analysis of conclusions and contributions:

The dissertation ends with 9 conclusions and 8 contributions, which are formulated clearly and in details. The contributions are well structured, deducible from literature data, own research and analysis. The interdisciplinary nature of the work allows consideration of the pain as a psychosomatic phenomenon. This is something perhaps trivially considered by psychiatry, but often underestimated in the clinical practice of somatic medicine, like many other psychosomatic syndromes. From a practical point of view, the application of the bio-psycho-social model in the therapeutic approach is in sync with all modern trends in medicine. This can be used in both the study population and all patients with chronic pain.

7. Limitations of the conducted research:

The factors described in the "Disadvantages of the study" section are, in practice, limitations that are, for the most part, objectively imposed by the pandemic situation in the country related to COVID-19 and the significantly changed mode of operation of the entire healthcare system. In practice, the goals and tasks set in the dissertation work can be fully fulfilled with the collected data.

8. Critical notes and recommendations:

As a recommendation, in the present work has been collected a lot of data that can serve as a basis for further research on the psychosomatic relationship between pain, anxiety and depression in different populations.

9. Publications and scientific events:

The results of the dissertation's scientific research on the topic have found a place in cited 10 publications - full text, in refereed scientific editions, posters and presentations in scientific conferences in the country and abroad. These indicators many times exceed all requirements for publication activity.

10. Conclusion:

The dissertation submitted for review by Dr. Simona Bogdanova-Petrova examines a current topic. The set goals and objectives have been fully fulfilled through the research methods applied, the data collected, the statistical processing and the analyzes and summary made. The study was appropriately designed and performed correctly, under extremely difficult clinical conditions during a pandemic. Contributions are well structured.

Given the stated scientific merits of the dissertation work, I vote positively and confidently recommend to the members of the esteemed scientific jury for the awarding of the educational and scientific degree "Doctor" to Dr. Simona Bogdanova-Petrova.

Prof. Georgi Panov

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