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**ABSTRACT**

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# THE IMPACT OF THE COVID-19 PANDEMIC ON MENTAL HEALTH OF MEDICAL STUDENTS: GENDER ASPECTS

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**Introduction.** The COVID-19 pandemic and the resulting decline in social communication have negatively affected many people's mental health, especially young people. This research aimed to investigate the mental health of Sumy State University medical students during the Covid-19 pandemic. This study was conducted from September 2020 to May 2021.

**Materials and Methods.** The second-year students of the Academic and Research Medical Institute of Sumy State University participated in the study – 100 female and 100 male students. The average age of the students was 18–22 years. The mental health of the medical students was examined using the Goldberg General Health Questionnaire (GHQ-28). The total scores for mental health, psychosomatic symptoms, anxiety, insomnia, social dysfunction, and depression were investigated. The experimental data were analyzed using PAST statistical software v4.05. The research was conducted in compliance with the WMA Declaration of Helsinki's "Ethical Principles for Medical Research Involving Human Subjects" after obtaining consent from all participants.

**Results and Discussion.** It was found that the COVID-19 pandemic caused mental health disorders in 63.5 % of medical students. There was no significant difference in the total GHQ score (> 8) between men and women. Social dysfunction occurred to be the most common mental health disorder in medical students. Somatic symptoms, anxiety, social dysfunction, and depression were observed in 37.5 %, 49 %, 64 %, and 14 % of medical students, respectively. The prevalence of social dysfunction and depression was higher in men than women.

**Conclusion.** It was established that men experienced more significant disturbances in mental health than women during the COVID-19 pandemic.

**Keywords:** mental health, medical students, Goldberg General Health Questionnaire (GHQ-28), COVID-19, pandemic.

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## ВПЛИВ ПАНДЕМІЇ COVID-19 НА МЕНТАЛЬНЕ ЗДОРОВ'Я СТУДЕНТІВ-МЕДИКІВ: ГЕНДЕРНІ АСПЕКТИ

**Вступ.** Пандемія COVID-19 і, як наслідок, обмеження соціальних взаємодій спричинили суттєвий негативний вплив на ментальне здоров'я населення, зокрема молоді. Дане дослідження присвячене вивченню стану ментального здоров'я студентів-медиків Сумського державного університету під час пандемії коронавірусу. Дослідження проводилося з вересня 2020 р. по травень 2021 р.

**Матеріали і методи.** У дослідженні взяли участь 200 студентів-медиків другого курсу Сумського державного університету – 100 чоловіків і 100 жінок. Середній вік студентів становив 18–22 роки. Стан ментального здоров'я студентів визначали за результатами анкети загального стану здоров'я (тест Голдберга). Були досліджені наступні показники: загальна оцінка ментального здоров'я, частота проявів соматичних симптомів, тривожності і безсоння, соціальної дисфункції, депресії. Статистичну обробку одержаних результатів здійснювали з використанням програмного забезпечення PAST v4.05. Дослідження було проведене згідно Гельсінської декларації ВМА «Етичні принципи медичних досліджень за участю людини у якості об'єкта дослідження» після отримання згоди всіх учасників.

**Результати і обговорення.** Встановлено, що пандемія коронавірусу спричинила порушення ментального здоров'я у 63,5 % студентів-медиків. Не виявлено суттєвої різниці між результатом загальної оцінки тесту Голдберга (> 8) у студентів чоловічої і жіночої статі. Найбільш поширеним порушенням ментального здоров'я студентів-медиків є соціальна дисфункція. Частота проявів соматичних симптомів, тривожності, соціальної дисфункції та депресії у студентів-медиків становила 37,5 %, 49 %, 64 % і 14 % відповідно. Студенти-чоловіки мали вищу частоту проявів соціальної дисфункції та депресії, ніж студенти-жінки.

**Висновки.** Результати дослідження свідчать, що порушення ментального здоров'я студентів-медиків, спричинене пандемією коронавірусу, більш виражене у чоловіків, ніж у жінок.

**Ключові слова:** ментальне здоров'я, студенти-медики, анкета загального стану здоров'я (тест Голдберга), коронавірус, пандемія.

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## INTRODUCTION / ВСТУП

Preserving young people's mental health is a crucial priority of society. The analysis of known cataclysms in the history of humankind indicates the aggravation of this issue precisely in the conditions of epidemics, wars, and natural disasters. Bad life experiences in overcoming stressful situations in which young people find themselves

during global adverse events put them on par with other mentally vulnerable social groups. As the analysis of the impact of the COVID-19 pandemic on different social groups in various countries shows, an environment with high psycho-social risks in which personality formation occurs can negatively affect young people's mental health [1–3]. Some conditions determine the degree of vulnerability to natural and social disasters. Not only should the age aspect be noted. The Pan American Health Organization (PAHO/WHO) points to gender as one of the determining factors affecting an individual's vulnerability [4]. The need to overcome the possible negative consequences of existing biological threats and to prevent adverse developments in the event of similar problems in the future explains the importance of studying the effect of various conditions/factors on the development of reactions in the bodies of young people, especially on their mental health. During the COVID-19 pandemic, numerous studies have been conducted with the participation of various groups of young people under the pressure of negative social and economic factors that were caused by this global disaster. Many studies have focused on changes in the mental health of the active part of the young population, namely students [5–7]. The argument in favor of these studies is the importance of developing support measures to quickly overcome the consequences of future epidemics/pandemics and other cataclysms. These measures have to consider certain aspects, including the age and gender of the person. Women and men adapt differently to stressful situations and get out of them [8, 9]. The physiological consequences, including mental health, may differ. Women are more inclined to communicate and seek psychological support in their environment. For men, talking about their problems and receiving sympathy can be seen as a demonstration of their weakness. At the same time, as research shows, during the COVID-19 pandemic, women experience a higher level of psychological stress than men [10, 11].

Comparing gendered psychological responses to stressful situations proves the existence of potentially different consequences for mental health. For young people of all genders in education, mental health determines their academic performance and overall social engagement, which is the basis for their future professional success [12]. Students' acquisition of professional and soft skills in the education process should be protected as much as possible from negative influences in the conditions of biological/social threats, regardless of their gender. Teachers who work with students daily can record the effects of adverse conditions on student performance. They must have tools to support the mental health of students of different genders in states of increasing social distancing and heavy psycho-social pressures. Based on the above, our work aimed to study the state of medical institute students' mental health during the COVID-19 pandemic, depending on their gender.

## Materials and Methods

### *Study design and sample*

This study was conducted at the Academic and Research Medical Institute of Sumy State University. The population included second-year students in the master's degree program in medicine. The entire population (200 individuals aged 18–22 years, 100 women and 100 men) was selected as the research sample. In order to assess the state of mental health, students were surveyed after obtaining their consent from September 2020 to May 2021.

### *Data collection*

After introducing himself/herself, the investigator explained the required issues on how the questionnaire must be filled out. The investigator then distributed questionnaires. Before enrollment, the students were assured that their information would remain confidential. All the participants provided written informed consent. The checklist was used to collect demographic characteristics, including age, gender, and country of origin. The students took up to 5 minutes to complete the questionnaire. It is worth mentioning that the investigator was present at the intended locations to answer the participants' probable questions.

### *Questionnaire preparation and validation*

The General Health Questionnaire-28 (GHQ-28) was used in this study (Table 1) [13].

Students compared their recent psycho-emotional states with their normal state. The questionnaire provided four answer options: A – «not at all», B – «no more than usual», C – «rather more than usual», D – «much more than usual» [14]. "A" and "B" were rated as 0 points, "C" or "D" were rated as 1 point [15]. The total score of the questionnaire was calculated by summing the scores of all the items. The maximum possible score was 28. The higher the score, the worse the mental health state. A total score of > 8 (out of 28) was considered a manifestation of mental health disorders [16]. The General Health Questionnaire (GHQ-28) contains four domains of seven questions each, directed at the detection of

Table 1 – The 28-items of the General Health Questionnaire [13]

| | HAVE YOU RECENTLY |
|---|---|
| 1 | Been feeling perfectly well and in good health? |
| 2 | Been feeling in need of a good tonic? |
| 3 | Been feeling run down and out of sorts? |
| 4 | Felt that you are ill? |
| 5 | Been getting any pains in your head? |
| 6 | Been getting a feeling of tightness or pressure in your head? |
| 7 | Been having hot or cold spells? |
| 8 | Lost much sleep over worry? |
| 9 | Had difficulty in staying asleep once you are off? |
| 10 | Felt constantly under strain? |
| 11 | Been getting edgy and bad-tempered? |
| 12 | Been getting scared or panicky for no good |
| 13 | Found everything getting on top of you? |
| 14 | Been feeling nervous and strung-up all the time? |
| 15 | Been managing to keep yourself busy and occupied? |
| 16 | Been taking longer over the things you do? |
| 17 | Felt on the whole you were doing things well? |
| 18 | Been satisfied with the way you've carried out your task? |
| 19 | Felt that you are playing a useful part in things? |
| 20 | Felt capable of making decisions about things? |
| 21 | Been able to enjoy your normal day-to-day activities? |
| 22 | Been thinking of yourself as a worthless person? |
| 23 | Felt that life is entirely hopeless? |
| 24 | Felt that life isn't worth living? |
| 25 | Thought of the possibility that you might make away with yourself? |
| 26 | Found at times you couldn't do anything because your nerves were too bad? |
| 27 | Found yourself wishing you were dead and away from it all? |
| 28 | Found that the idea of taking your own life kept coming into your mind? |

physical symptoms (items 1–7), anxiety and insomnia (items 8–14), social dysfunction (items 15–21), and depression (items 22–28). A score of > 8 (out of possible 28) and > 3 (out of possible 7) was considered a manifestation of a mental health disorder.

***Data analysis***

After collecting the questionnaires, data analysis was performed using the PAST statistical software v4.05 [17]. We used the Shapiro–Wilk W test to evaluate the type of data distribution. The Shapiro–Wilk W test showed that the data were normally distributed. The Mann–Whitney test was used to analyze the differences in the data. Statistical significance was set at $p < 0.05$.

***Ethical considerations***

The research was conducted in compliance with the rules of the WMA Declaration of Helsinki, "Ethical principles for medical research involving human subjects," after obtaining written consent from all participants. They were assured that their information would remain confidential. This study

was approved by the Ethics Committee of Sumy State University (Academic and Research Medical Institute), Sumy, Ukraine.

**Results**

This study on the mental health of students involved 200 second-year students at the Academic and Research Medical Institute of Sumy State University. Among the surveyed students, 100 were women, and 100 were men. Table 2 presents the demographic characteristics of the participants. The distribution of respondents by country was as follows – 34 % of students were from Ukraine, 34 % – were from India, 18,5 % – were from Nigeria, 7,5 % – were from Tanzania, and 6 % – were from Egypt. The average age of the students was 18–22 years.

The average GHQ-28 questionnaire score was 9.14. Slightly more than half (63.5 %) of students had a score of 8 or higher, which suggested disturbances in mental well-being. Our study examined the relationship between gender and the level of psychological well-being among medical students. The prevalence of psycho-emotional disorders in women and men was 65 % and 62 %, respectively.

Table 2 – Demographic characteristics of study participants

| Country | Total number | Women | Men |
|---|---|---|---|
| Ukraine | 68 | 47 | 21 |
| India | 68 | 27 | 41 |
| Nigeria | 37 | 15 | 22 |
| Tanzania | 15 | 6 | 9 |
| Egypt | 12 | 5 | 7 |

The average GHQ-28 questionnaire scores were compared between female and male students (Table 3). The results suggested no significant difference in the total mental health score between women and men.

The next step of our study was to examine the frequency of different disturbances in medical students' mental health in the context of pandemic restrictions. We compared the prevalence of somatic symptoms, anxiety, insomnia, social dysfunction, and depression between female and male students (Fig. 1).

Table 3 – Results of the GHQ-28 score in medical students at Sumy State University

| Score | All students | Women | Men |
|---|---|---|---|
| Total GHQ-28 (items 1–28) | 9,14 ± 0,24 | 8,75 ± 0,21 | 9,56 ± 0,32 |
| Somatic symptoms (items 1–7) | 2,20 ± 0,15 | 2,20 ± 0,13 | 2,20 ± 0,19 |
| Anxiety, insomnia (items 8–14) | 2,59 ± 0,11 | 2,71 ± 0,17 | 2,47 ± 0,12 |
| Social dysfunction (items 15–21) | 3,22 ± 0,15 | 3,00 ± 0,21 | 3,45 ± 0,13 |
| Depression (items 22–28) | 1,12 ± 0,09 | 0,83 ± 0,04* | 1,42 ± 0,06 |

*Note: * – $p \leq 0.05$ compared to men*

It was found that social dysfunction was the primary disturbance of the mental health of medical students: 59% of female students and 69 % of male students had this disturbance. The prevalence of social dysfunction was higher in men than in women: 69 % and 59 %, respectively. The number of men with depression was more than two times that of women. The frequency of somatic symptoms, anxiety, and insomnia among medical students was similar in men and women.

**Discussion**

The study of the impact of the COVID-19 pandemic on the state of mental health was conducted on a sample of second-year students of the Academic and Research Medical Institute of Sumy State University during two semesters of the 2020–2021 academic year (9 months) when the whole world was under the pressure of forced social isolation and imposed restrictions. For students, it was a challenging year to transition to distance education.

Domestic and international students participated in the study. The choice of a group of second-year students for research was because they had already passed the first year of adaptation to the university study process, had learned all the rules and algorithms of the academic process, and had formed a certain social circle to realize themselves in the student society. At the research design stage, we considered the conditional assumption that the negative factors associated with the beginning of

university studies and the need to adapt to new conditions were leveled. Simultaneously, these students are juniors who may be more vulnerable to stressors caused by the pandemic than senior students. Their reactions can be more indicative and can serve as a basis for developing a supported algorithm for similar situations in the future.

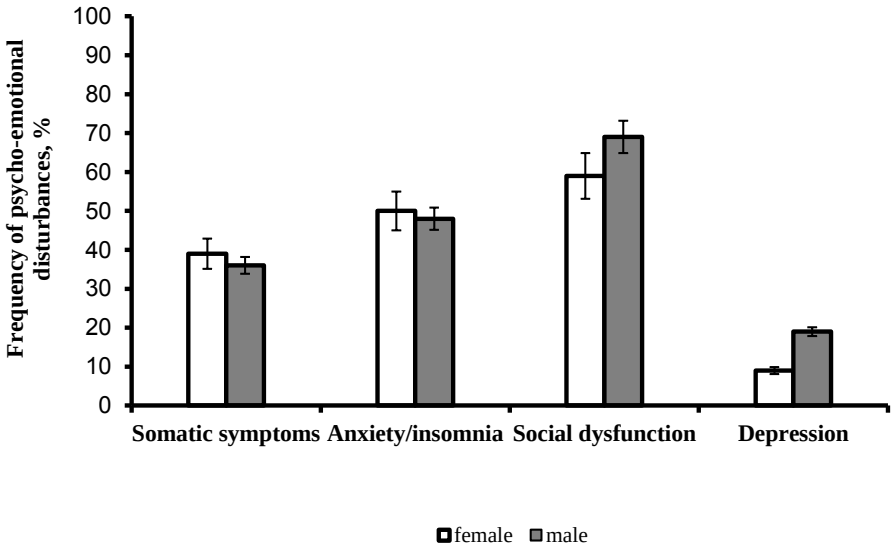


Figure 1 – Frequency (%) of psycho-emotional disturbances in medical students ($p \leq 0.05$ compared to male)

Studies show that in the student period of life, the levels of stress and anxiety increase in young people, and the risk of developing depression and exhaustion increases [18]. These problems can be exacerbated in crises such as the COVID-19 pandemic. Against the background of social isolation, concern for personal health and their loved ones, informational pressure about the infection, its consequences, and the global crisis, the psycho-physiological reactions of young people can harm their mental health [19, 20]. The introduction of distance learning, restrictions on public student life, and distance from their families have negatively affected the psychological state of international students. In addition, students may develop future insecurity in their ability to achieve academic and professional fulfillment [21]. According to the literature, young people aged 18-25 belong to the group with the most significant risk of the negative impact of stressful situations [22].

The results of our study indicated that the vast majority of medical students (63.5%) had mental health disorders during the COVID-19 pandemic. The frequencies of somatic symptoms, anxiety, social dysfunction, and depression in the medical students were 37.5%, 49%, 64%, and 14%, respectively. Social dysfunction is the primary mental health disorder among medical students. The obtained data correlated with studies conducted in Great Britain among college students [23]. The authors of similar studies note that changes in the mental health of the population cause general political concern. As stated in the analytical note of the United Nations (May 20, 2020), young people belong to a social group of people that needs special attention because they belong to vulnerable segments of the population ("United Nations report", United Nations, 2020).

Numerous studies on the effects of the pandemic on students' health emphasize the need to develop and implement new action algorithms that can help overcome the psychological consequences and improve their overall health. In recent years, coping strategies have gained popularity, which allows individuals to adapt to stressful situations and form their approaches to overcoming them, which is essential in the conditions of the COVID-19 pandemic [24]. Young people still have terrible life experiences when forming anti-stress behavior in complex situations. Regarding the use of coping strategies described in the literature, not all young people are interested in psychological literature and know about them. Teachers should help students use practical tools to support their mental health. Therefore, it is necessary to provide teachers with a scientifically based methodological base for organizing such assistance.

Biological threats – which humanity is predicted to face in the future – have specific effects on individuals. When communicating with students,

teachers must understand which traumatic conditions are dominant in particular situations and use specific support algorithms. In addition, in the process of communicating with students, teachers should consider other factors that determine the degree of negative impact on students' psychological health. In this context, the gender correlations of the traumatic effects of the pandemic on personality are of interest. Studies of college students in various countries indicate the existence of uncertainty in this matter. Based on meta-analysis data [25], most scientists consider female students psychologically more vulnerable to the impact of the COVID-19 pandemic. Simultaneously, women are naturally more inclined to use adaptive coping strategies intuitively; therefore, their mental health may be more protected.

In our study, we focused on the psychological reactions of students of different genders to the traumatic circumstances in which they found themselves during the pandemic. Our research also indicates that compared to women, men had a higher rate of social dysfunction. The number of male students with depression was twice as high as that of female students. Thus, according to the data obtained, the mental health of male medical students was more negatively affected by the COVID-19 pandemic than that of female students.

Numerous studies indicate that women are more prone to distress due to traumatic factors, but this gender difference is not absolute; it can even change depending on the interaction of various factors [26].

## CONCLUSIONS / ВИСНОВКИ

The obtained results confirm the negative impact of the traumatic conditions of the COVID-19 pandemic on the mental health of students and the need for their psychological support. Male students, who have increased pressure of circumstances and possibly psychosomatic consequences in the distant future, need special attention.

From the viewpoint of the authors of this article, the work of universities in the conditions of pandemics and other crises should consider the need to activate psychological services concerning all aspects of the educational process. The effective involvement of teachers in this process is possible by providing them with specific practical "tools of influence". Such means can be modern coping strategies developed using similar studies. Studying coping strategies will allow teachers to effectively support students' physical and mental health in crisis situations.

## PROSPECTS FOR FUTURE RESEARCH / ПЕРСПЕКТИВИ ПОДАЛЬШИХ ДОСЛІДЖЕНЬ

The authors of this study support the concept existing in the literature of effectively overcoming the effects of the pressure of negative factors during the pandemic by changing the way of life [23]. First, we are talking about improving the state of mental health due to the increased physical activity of students over the long term. Transitioning to a healthy lifestyle with excellent and constant physical activity will allow students to overcome the effects of stressful factors such as a pandemic. An additional contribution to the growing amount of data in this direction can be studies of changes in students' mental health before and after the pandemic, under increasing weekly physical activity.

For young people receiving medical education, the mechanisms of adaptation to extreme situations are highly relevant because future professional training involves the influence of numerous stress factors. Choosing the best coping strategies supports physical and mental health and promotes professional adaptation and gender characteristics. Men and women react differently to stress. The biological basis of these differences requires further research. In particular, it is promising to study the effectiveness of various coping strategy models for the professional adaptation of future doctors.

## CONFLICT OF INTEREST / КОНФЛІКТ ІНТЕРЕСІВ

The authors declare no conflict of interest.

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None.

## AUTHOR CONTRIBUTIONS / ВКЛАД АВТОРІВ

All authors substantively contributed to the drafting of the initial and revised versions of this paper. They take full responsibility for the integrity of all aspects of the work.

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