



General Health Status of Medical Students During COVID-19 Pandemic and Relevant Factors in Medical Students of Arak University of Medical Sciences in 2021

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Abstract

Background and aims: The present study examined the general health status following the COVID-19 pandemic and relevant parameters among internship and externship medical students.

Methods: In this cross-sectional study, 400 externship and internship medical students at Arak University of Medical Sciences in 2021 were recruited, to whom the 28-item general health questionnaire developed by Goldberg was administered. In the questionnaire, 23 is considered the cut-off point, and higher scores indicate worse general health. The data were statistically analyzed using SPSS version 23.0.

Results: The mean general health score was 25.24 ± 9.71 , and the prevalence of general health disorders was 51%. The results represented no significant difference between the externship and internship students concerning the total general health score and subscales of somatic symptoms, anxiety and insomnia, and social dysfunction. However, interns had a significantly higher depression score compared to externs ($P=0.029$). Age, gender, marital status, history of COVID-19, and residence status were not statistically significantly related to the general health score.

Conclusion: More than half of the interns and externs at Arak University of Medical Sciences developed general health disorders during the COVID-19 outbreak. The results revealed no significant relationship between the total score of general health and gender, age, marital, residence, and COVID-19 status.

Keywords: General health, Medical students, COVID-19

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Introduction

An unknown virus was detected in Wuhan, China, in December 2019, which quickly spread to different continents.¹ Therefore, the World Health Organization (WHO) introduced it as one of the most important public health concerns worldwide. This pathogen belongs to the RNA betacoronavirus family, known as SARS-COV-2. This pandemic affected all aspects of life.^{1,2}

Healthcare personnel are often on the front line of the fight against epidemics. They face significant threats worldwide because of exposure to severe and contagious diseases such as COVID-19. In addition, the COVID-19 pandemic is considered one of the leading causes of death in many trained and experienced healthcare specialists worldwide.^{3,4}

Health crises such as the coronavirus pandemic lead to mental changes caused by fear, anxiety, depression, and insecurity in people and healthcare personnel.^{2,5,6} In general, all health-related aspects should be considered to check the health status of individuals. Given the

coronavirus pandemic, the unknown nature of the disease, and the creation of mental crises,⁷ mental health tools should be used to evaluate the health status. The Goldberg 28-item General Health Questionnaire (GHQ-28) is one of the useful questionnaires used for evaluating the health status.⁸ This questionnaire contains the general health dimensions of somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression. It can inform health system planners about mental disorder prevention.⁹ Little is known about what is happening among people in the real world after the COVID-19 pandemic.^{10,11} Medical students,¹² including externs and interns, have fought against the deadly coronavirus, whose mental health has been influenced by several parameters during the COVID-19 pandemic.^{10,12} Therefore, assessing the general health of this group and identifying influential factors can help design efficient interventions to enhance health status.¹³ The present study examines the general health status following the COVID-19 pandemic and relevant parameters among internship and externship

medical students.

Materials and Methods

Type of Study

The present cross-sectional study evaluated the general health of externship and internship medical students at Arak University of Medical Sciences in 2021.

Study Population

After obtaining ethical approval and collaborating with the education department of the university for collecting data, the researcher referred to the education departments where the interns and externs (target group) attended. Then, the data were gathered following the explanation of the objectives of the study and obtaining the subjects' consent to participate in the study.

The inclusion criteria were having physical and mental health, being internship and externship medical students at Arak University of Medical Sciences, and having no history of diagnosed mental illness, depression, and anxiety. Further, the other inclusion criteria were the lack of detected underlying and chronic diseases and no experience of stressful events such as the death of relatives or acquaintances due to COVID-19 leading to depression and anxiety. The individuals who filled out the questionnaire incompletely and presented insufficient information were excluded.

Sample Size and Sampling Method

According to the study by Hayati et al, about 50% of staff in hospitals affiliated to Tehran University of Medical Sciences were suspected of having general health disorders.¹⁴ Finally, considering an alpha error of 5%, the sample size of this study was determined to be 384 people, which was increased to 400 people to compensate for possible dropouts. After obtaining informed consent, 400 internship and externship medical students were selected using a stratified random sampling method. Then, the Goldberg 28-item general health questionnaire (GHQ-28) was given.

Data Collection Tool

The questionnaire consists of demographic information such as marital status and educational level, the type of vaccine, and history of infection with COVID-19. The main GHQ includes 60 questions. However, the 28-item version was utilized to examine general health in the present study.

In a study on students at Shiraz University, Taghavi et al evaluated the validity and reliability of this questionnaire, and Cronbach's alpha was 0.90.¹⁵ The GHQ-28 assesses an individual's health status during the last month and comprises four subscales, each with seven questions. Questions 1-7, 8-14, 15-21, and 22-28 are related to the subscales of somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression, respectively. The score of each dimension was separately determined

for each subject, followed by calculating the total score by summing the obtained values for four subscales. The lower score reflects better mental health, and the cut-off point is 23. Accordingly, the individuals getting 23 or less are healthy or have no mental disorder, while those with a score of 24 or higher are candidates for a mental disorder.¹⁵

Statistical Analysis

The quantitative variables were described as mean \pm SD, and the number (%) was determined for categorical and ordinal data. The independent sample *t*-test was employed to compare the mean general health score between two groups of medical students (externs and interns). Pearson's correlation coefficient was used to evaluate the relationship between quantitative variables such as age and GHS score. SPSS version 23.0 was applied for statistical analysis. A significance level of 0.05 was considered in all tests.

Results

A total of 400 subjects were included in the study (218 externs (54.5%) and 182 interns (45.5%)), with a mean \pm SD age of 24.73 ± 1.57 years. Additionally, the mean time interval from the last COVID-19 vaccine dose was 4.45 ± 2.26 months. The results of the Spearman test ($r = 0.004$) indicated no statistically significant relationship between age and general health score ($P = 0.933$).

As shown in Table 1, no significant relationship was observed between general health score and gender, marital status, and residence. The type of vaccine was not significantly related to the mean general health score; however, the mean value was higher among those who received live vaccines such as AstraZeneca and Sputnik. Furthermore, the mean general health score was insignificantly higher among individuals with a history of

Table 1. General Health Status of Internship and Externship Medical Students at Arak University of Medical Sciences by Demographic Variables

Variables	Categories	Number (%)	General health score Mean \pm SD	P Value
Gender	Female	291 (72.8)	25.29 \pm 9.77	0.793
	Male	109 (27.2)	25.10 \pm 9.58	
Marital status	Married	78 (19.5)	25.92 \pm 11.96	0.647
	Single	322 (80.5)	25.08 \pm 9.09	
Residence status	Native	147 (36.8)	24.74 \pm 9.44	0.210
	Non-native	253 (63.2)	26.10 \pm 10.12	
Type and status of COVID-19 vaccine	AstraZeneca	170 (42.5)	26.44 \pm 10.08	0.220
	Sino Pharm	118 (29.5)	23.80 \pm 9.86	
	Sputnik	86 (21.5)	25.53 \pm 9.86	
	Bharat	14 (3.5)	23.35 \pm 2.84	
	Barekat	6 (1.5)	22.00 \pm 1.09	
History of COVID-19	None	6 (1.5)	23.00 \pm 3.10	0.279
	Yes	189 (47.3)	25.41 \pm 9.14	
	No	211 (52.8)	25.06 \pm 10.32	

COVID-19 ($P=0.279$).

The mean general health score was 25.24 ± 9.71 . Based on the cut-off point of 23 for the total health score, 196 (49%) subjects were healthy, and 204 (51%) suffered from general health disorders. Table 2 compares general health scores and their dimensions between the externship and internship periods. As demonstrated, the internship and externship medical students were not significantly different in the total general health score, the subscales of somatic symptoms, anxiety and insomnia, and social dysfunction. However, the interns were considerably more depressed than the externs ($P=0.029$).

Discussion

During the COVID-19 pandemic, externs and interns have fought against the deadly coronavirus, and their mental health has been affected by various factors. Due to fear, anxiety, depression, and insecurity, health crises such as the coronavirus pandemic caused mental changes among people and healthcare personnel.^{2,6,10} In general, the health status of individuals should be evaluated by considering all health-related aspects. In this regard, using mental health tools is essential due to the coronavirus pandemic, the unknown nature of the disease, and the formation of mental crises. Therefore, examining general health in medical students and identifying influencing parameters can help design efficient interventions for promoting health status.

Based on the results of the present study, the mean general health score was 25.24 ± 9.71 among the medical students. In addition, more than 50% of the medical students suffered from general mental health disorders. This issue is essential in the educational planning of the group and reveals the necessity of therapeutic counseling and preventive measures for interns and externs. The results align with those of Hayati et al, who demonstrated that 47.5% of individuals were suspected of having general health disorders.¹⁴ According to Saraswathi et al,¹⁰ the COVID-19 pandemic negatively influenced the mental health of externship medical students by increasing the prevalence and level of anxiety and stress, as well as intensifying depressive symptoms. Addressing and reducing the adverse effect of COVID-19 on the mental health of this population are considered crucial.¹⁰ Davarinia Motlagh Quchan et al¹¹ found a low mental health level among the nurses at the therapeutic center in Sabzevar City during the COVID-19 pandemic.

The results of the present study represented no

significant difference in the mean general health score between externs and interns. Further, the somatic symptoms, anxiety and insomnia, and social dysfunction were not significantly related to the educational level. Regarding the three dimensions, the interns and externs were not significantly different. However, the mean depression score was higher among interns, which may be ascribed to their longer exposure to the clinical departments in the hospital and higher attendance in the therapeutic departments. Furthermore, job strain, heavy shifts, and more prolonged exposure to patients during the COVID-19 pandemic can be addressed as the reasons for the higher depression score of interns compared to the externs. The other causes include a heightened awareness of the nature of the disease as well as fear and anxiety. Ranjbar Roghani et al reported medical students' proper understanding and attitude towards COVID-19 and significantly more attention among individuals in the higher semesters and educational level.¹³ Based on the results of a study conducted in China during the severe outbreak of SARS, 89% of the healthcare personnel involved in high-risk conditions expressed mental symptoms and depression. The personnel presented a complex psychological response to the infectious disease epidemic.¹⁶ Distress may be induced by the sense of vulnerability, loss of control, worry about the health of one's family and others, virus spread, change in work, and separation.^{16,17}

In the present study, the age, gender, and general health of the subjects were not significantly different. It is worth noting that females are successful in doing social and academic duties, especially in medicine and its difficulties, despite their more fragility and less tolerance to mental problems, trauma, and depression compared to males.

The results indicated an insignificantly higher mean general health score among married students compared to single ones. Additionally, no significant difference was detected in the mean general health score of native and non-native individuals, but the non-native ones had a higher standard. According to the study conducted by Arjmandi et al, there was no significant difference in depression and anxiety scores between native and non-native students.¹⁸ Similarly, Norouzinia et al found that mental health and anxiety are not significantly different among native and non-native students, as well as married and single ones.¹⁹

Regarding the present study, the subjects who received AstraZeneca and Sputnik COVID-19 vaccines had higher

Table 2. Scores of General Health and its Subscales among Internship and Externship Medical Students at Arak University of Medical Sciences

Educational level	Total Mean \pm SD	Extern Mean \pm SD	Intern Mean \pm SD	P value
Total score of general health	25.24 \pm 9.70	25.32 \pm 9.25	25.14 \pm 10.25	0.318
Somatic symptoms	5.90 \pm 3.24	6.16 \pm 3.29	5.59 \pm 3.16	0.075
Anxiety and insomnia	7.21 \pm 4.16	7.34 \pm 4.01	7.04 \pm 4.43	0.207
Social dysfunction	7.65 \pm 2.80	7.71 \pm 2.81	7.57 \pm 2.79	0.118
Severe depression	4.58 \pm 4.63	4.23 \pm 4.45	4.99 \pm 4.82	0.029

general health scores. At the same time, more individuals got a score below the cut-off point and were healthy following the injection of other vaccines. However, the differences were insignificant. No study has highlighted this issue. The fear of those receiving AstraZeneca and Sputnik vaccines from their complications may be a reason for the higher general health score.²⁰⁻²⁴

Further, the students with and without a history of COVID-19 were similar in terms of the mean general health score. Accordingly, the general health score was not significantly related to the history of COVID-19. However, the infection with COVID-19 and recovery may significantly affect patients' mental health because of being hospitalized in the in-patient department and observing the death or illness of others.

Conclusion

The results represented general health disorders in around half of the internship and externship medical students at Arak University of Medical Sciences during the outbreak of COVID-19. The results represented no statistically significant difference between the externship and internship students in the total general health score and subscales of somatic symptoms, anxiety, insomnia, and social dysfunction. However, interns had a significantly higher depression score compared to the externs. The results revealed no significant relationship between the total score of general health and gender, age, marital status, residence, and history of COVID-19.

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Authors' Contribution

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Competing Interests

None.

Ethical Approval

This study was approved by the Ethics Committee of the Arak University of Medical Sciences (IR.ARAKMU.REC.1400.200).

References

1. Yang Y, Lu QB, Liu MJ, Wang YX, Zhang AR, Jalali N, et al. Epidemiological and clinical features of the 2019 novel coronavirus outbreak in China. medRxiv [Preprint]. February 21, 2020. Available from: <https://www.medrxiv.org/content/10.1101/2020.02.10.20021675v2>.
2. Salari N, Hosseini-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, et al. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health*. 2020;16(1):57. doi: [10.1186/s12992-020-00589-w](https://doi.org/10.1186/s12992-020-00589-w).
3. Jalil M, Ashkan Z, Gholamnezhad M, Jamalidoust S, Jamalidoust M. Effect of COVID-19 on healthcare workers' morbidity and mortality compared to the general population in Kohgiluyeh and Boyer-Ahmad province, Iran. *Health Sci Rep*. 2023;6(1):e961. doi: [10.1002/hsr2.961](https://doi.org/10.1002/hsr2.961).
4. Alshamrani MM, El-Saed A, Al Zunitan M, Almulhem R, Almohrij S. Risk of COVID-19 morbidity and mortality among healthcare workers working in a Large Tertiary Care Hospital. *Int J Infect Dis*. 2021;109:238-43. doi: [10.1016/j.ijid.2021.07.009](https://doi.org/10.1016/j.ijid.2021.07.009).
5. Mohaghegh P, Abedi E, Sofian M, Rafiei F. Evaluating COVID-19 related health anxiety among individuals referring to urban health centers in Arak, Iran: a cross-sectional study. *Int J Epidemiol Res*. 2021;8(1):3-8. doi: [10.34172/ijer.2021.02](https://doi.org/10.34172/ijer.2021.02).
6. Clemente-Suárez VJ, Navarro-Jiménez E, Jimenez M, Hormeño-Holgado A, Martínez-González MB, Benítez-Agudelo JC, et al. Impact of COVID-19 pandemic in public mental health: an extensive narrative review. *Sustainability*. 2021;13(6):3221. doi: [10.3390/su13063221](https://doi.org/10.3390/su13063221).
7. Suka M, Yamauchi T, Yanagisawa H. Changes in health status, workload, and lifestyle after starting the COVID-19 pandemic: a web-based survey of Japanese men and women. *Environ Health Prev Med*. 2021;26(1):37. doi: [10.1186/s12199-021-00957-x](https://doi.org/10.1186/s12199-021-00957-x).
8. Maghsoodi S, Hesabi M, Emami Sigaroudi A, Kazemnejad Leili E, Monfared A. General health and related factors in employed nurses in medical-educational centers in Rasht. *J Holist Nurs Midwifery*. 2015;25(1):63-72. [Persian].
9. Rashidi MA, Pournajaf A, Kazemy M, Kaikhavani S. Evaluating general health status using Goldberg's general health questionnaire among the staff of Ilam University of Medical Sciences in 2015. *J Ilam Univ Med Sci*. 2018;26(3):16-26. doi: [10.29252/sjimu.26.3.16](https://doi.org/10.29252/sjimu.26.3.16). [Persian].
10. Saraswathi I, Saikarthik J, Senthil Kumar K, Madhan Srinivasan K, Ardhanaari M, Gunapriya R. Impact of COVID-19 outbreak on the mental health status of undergraduate medical students in a COVID-19 treating medical college: a prospective longitudinal study. *PeerJ*. 2020;8:e10164. doi: [10.7717/peerj.10164](https://doi.org/10.7717/peerj.10164).
11. Davarinia Motlagh Quchan A, Tajabadi A, Borzoe F, Heshmatifar N, Mohamadzadeh Tabrizi Z, Rastaghi S. Comparison of mental health of nurses working in COVID-19 reference hospitals with other hospitals. *J Mil Med*. 2020;22(11):1145-52. [Persian].
12. Essadek A, Gressier F, Robin M, Shadili G, Bastien L, Peronnet JC, et al. Mental health of medical students during the COVID19: impact of studies years. *J Affect Disord Rep*. 2022;8:100318. doi: [10.1016/j.jadr.2022.100318](https://doi.org/10.1016/j.jadr.2022.100318).
13. Ranjbar Roghani A, Nemati R, Fathi Y, Sheikhnavaaz Jahed S, Ajri Khamloo F, Ajri Khamlou M. Knowledge and attitude for medical students towards COVID-19. *Iran Journal of Nursing*. 2020;33(126):44-57. doi: [10.52547/ijn.33.126.44](https://doi.org/10.52547/ijn.33.126.44). [Persian].
14. Hayati Y, Rahmani H, Arab M. Assessing general health of staff affiliated to Tehran University of Medical Sciences hospital and its related factors in 2014. *Hospital*. 2017;16(3):104-10. [Persian].
15. Taghavi SMR. Validity and reliability of the general health questionnaire (GHQ-28) in college students of Shiraz University. *J Psychol*. 2002;5(4):381-98. [Persian].
16. Chong MY, Wang WC, Hsieh WC, Lee CY, Chiu NM, Yeh WC, et al. Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. *Br J Psychiatry*. 2004;185:127-33. doi: [10.1192/bjp.185.2.127](https://doi.org/10.1192/bjp.185.2.127).

17. Rakhshan M, Hakimi H, Mousazadeh N, Dorri S. Challenges of mental health in medical staffs during COVID-19 outbreak: a systematic review. *Med Clin Pract.* 2023;6(2):100361. doi: [10.1016/j.mcpsp.2022.100361](https://doi.org/10.1016/j.mcpsp.2022.100361).
18. Arjmandi E, Horri F, Navaei P. Comparison of depression and anxiety disorders among native and non-native students of Islamic Azad University of Medical Sciences in Tehran. *Canon J Med.* 2019;1(1):21-6. doi: [10.30477/cjm.2019.81767](https://doi.org/10.30477/cjm.2019.81767).
19. Norouzinia R, Aghabarari M, Karimi M, Sabzmakan L, Mirkarimi M, Khorasani M. Survey of anxiety levels and its relation to students demographic of Alborz University of Medical Sciences. *Alborz Univ Med J.* 2012;1(4):200-6. doi: [10.18869/acadpub.aums.1.4.200](https://doi.org/10.18869/acadpub.aums.1.4.200). [Persian].
20. Harrison EA, Wu JW. Vaccine confidence in the time of COVID-19. *Eur J Epidemiol.* 2020;35(4):325-30. doi: [10.1007/s10654-020-00634-3](https://doi.org/10.1007/s10654-020-00634-3).
21. Wang MW, Wen W, Wang N, Zhou MY, Wang CY, Ni J, et al. COVID-19 vaccination acceptance among healthcare workers and non-healthcare workers in China: a survey. Available at SSRN: <https://ssrn.com/abstract=3816767>.
22. Riad A, Sağıroğlu D, Üstün B, Pokorná A, Klugarová J, Attia S, et al. Prevalence and risk factors of CoronaVac side effects: an independent cross-sectional study among healthcare workers in Turkey. *J Clin Med.* 2021;10(12):2629. doi: [10.3390/jcm10122629](https://doi.org/10.3390/jcm10122629).
23. Klugar M, Riad A, Mekhemar M, Conrad J, Buchbender M, Howaldt HP, et al. Side effects of mRNA-based and viral vector-based COVID-19 vaccines among German healthcare workers. *Biology (Basel).* 2021;10(8):752. doi: [10.3390/biology10080752](https://doi.org/10.3390/biology10080752).
24. Hause AM, Gee J, Johnson T, Jazwa A, Marquez P, Miller E, et al. Anxiety-related adverse event clusters after Janssen COVID-19 vaccination - five U.S. mass vaccination sites, April 2021. *MMWR Morb Mortal Wkly Rep.* 2021;70(18):685-8. doi: [10.15585/mmwr.mm7018e3](https://doi.org/10.15585/mmwr.mm7018e3).