Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Prevalence of generalized anxiety disorder among nursing students in Iran during the COVID-19 pandemic: A web-based cross-sectional study

Maryam Hasanpour a, Saman Maroufizadeh b, Hossein Mousavi a, Fatemeh Noughani a,*, Mojgan Afshari c

a Department of Psychiatric Nursing, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran
b Department of Biostatistics, School of Nursing and Midwifery, Guilan University of Medical Sciences, Rasht, Iran
c Department of Medical-Surgical Nursing, School of Nursing and Midwifery, Tehran University of Medical Sciences, Tehran, Iran

ARTICLE INFO

Keywords:
Anxiety
COVID-19
Nursing student
Iran

ABSTRACT

Background: The Coronavirus disease 2019 (COVID-19) is a public health emergency that poses anxiety symptoms to nursing students (P. Li et al., 2020). Therefore, this study aimed to examine the prevalence of anxiety and its associated factors in nursing students in Iran during the COVID-19 pandemic.

Methods: We performed this web-based cross-sectional study on 174 nursing students in Iran, between 4 and 24 April 2020. Data were collected through an online questionnaire using social media like Telegram and WhatsApp. Anxiety was measured via the Generalized Anxiety Disorder-7 (GAD-7). Simple and multiple logistic regression analyses were undertaken to examine independent predictors of anxiety. Statistical analysis was performed using SPSS for Windows, version 16.0.

Results: The mean GAD-7 total score was 6.05 ± 4.77, and the prevalence of GAD using a cut-off value of 10 for the GAD-7 was 20.7%. According to the adjusted analysis, GAD was significantly associated with having chronic infectious diseases (OR = 5.74, 95% CI: 1.39–23.72), long time thinking about COVID-19 (OR = 14.09, 95% CI: 4.36–45.54), and death of family members, relatives or friends due to COVID-19 (OR = 4.53, 95% CI: 1.08–18.93).

Conclusion: The prevalence of GAD is considerably high in nursing students during the COVID-19 pandemic in Iran. Thus, a holistic approach, including management policies, psychosocial interventions, and training, is critical to reducing anxiety symptoms during the COVID-19 pandemic as well as during any outbreaks of other infectious diseases in the future.

1. Introduction

Anxiety is a psychological condition that all human beings have almost experienced during their lives in different degrees. But when it rises and reaches a level that causes distress and conflict, it is known as a disorder. Generalized Anxiety Disorder (GAD) is one of the most common disorders characterized by persistent, excessive, and unrealistic concerns about everyday issues (Yu et al., 2018). GAD can cause sleeping, concentration, and physical problems such as; Exhaustion, headaches, muscle aches and pains and many other problems in the future (Rijn & Wild, 2013). There is evidence that this disorder is more common in people who have had life crises (Li, Wang, Xue, Zhao, and Zhu, 2020). Nursing students have experienced stress and anxiety over their course during the Coronavirus disease 2019 (COVID-19) outbreak (Beck and Srivastava, 1991). In addition to the prevalence of the disease and physical and clinical problems, their concerns are related to continuing classes and internships (Tully, 2004). Preliminary studies in China showed an increase in anxiety and stress among nursing students (Admi, 1997). Coronavirus is a large family of viruses. A new type of coronavirus has recently spread in Wuhan, China, in December 2019, and the virus has been called COVID-19 (Li, Fu et al., 2020). The symptoms of the virus range are from mild to severe. Signs and symptoms of infection include fever of 89%, cough 68%, fatigue 38%, sputum production 34% and shortness of breath 19% (Guan et al., 2020). COVID-19 can be asymptomatic or cause a mild infection in the upper respiratory tract. In more severe cases, it can lead to more severe...
respiratory infections, which can even lead to death (Covid & Team, 2020). Preventive measures revolve mainly around social distance and quarantine. One of the most important is to avoid being in crowded places and being safe from people and also hand washing (Sallam et al., 2020). COVID-19 spreads easily in infected areas of the community. COVID-19 has infected 213 countries and territories and 2 international conveyances around the world (Wu & McGoogan, 2020). The world has been severely affected by the COVID-19. In addition to affecting health care systems, it causes anxiety among the population which leads to a deficit in economic and educational system (Sallam et al., 2020). In total, 6,204,725 people around the world and 151,466 people in Iran were infected with this virus, of which 118,848 people recovered and 7797 people died, and this trend continues (Jiet, 2003). COVID-19 has also spread in Iran since late 2019 and quickly endangered people’s physical and mental health (Wu & McGoogan, 2020). Anxiety is a common symptom in patients with chronic respiratory disorders and can significantly reduce patients’ quality of life. In almost all cases, anxiety assessment includes physical cases that can overlap with the symptoms of chronic respiratory illness and the side effects of medications. Clinical anxiety affects up to two-thirds of chronic respiratory patients, leading to reduced quality of life and physical function. Little research has been done on anxiety experiences in patients with severe respiratory symptoms (Bajema et al., 2020). Anxiety about COVID-19 is also common among people in the community and seems to be due in large part to the unknown and cognitive ambiguity in people about the virus. Fear of the unknown reduces the perception of immunity in humans and has always been a concern for humans. Low scientific knowledge about COVID-19 also exacerbates this anxiety (Beck and Srivastava, 1991). At this time, people are looking for more information to relieve their anxiety. Anxiety can make people unable to recognize right and wrong information, so they may be exposed to false news. Stress and anxiety can weaken the can make people unable to recognize right and wrong information, so they may be exposed to false news. Stress and anxiety can weaken the

2.2. COVID-19-related variables

The COVID-19-related variables included: (1) having chronic diseases, (2) times to focus on COVID-19 per day, (3) contact with suspected or confirmed COVID-19 cases, (4) death of family member, relatives or friends due to COVID-19.

2.2.3. Generalized anxiety disorder-7 (GAD-7)

The GAD-7 is a 7-item self-report measure that assesses GAD symptoms during the last two weeks based on DSM-IV criteria (Spitzer, Kroenke, Williams, & Löwe, 2006). Each item is rated on a 4-point Likert-type scale ranging from 0 (not at all) to 3 (nearly every day). Total scores range from 0 to 21, with higher scores indicating greater GAD symptoms. A total score of 10 or more is considered indicative of GAD symptoms. The Persian version of this measure has been shown to have good reliability and validity (Omami-Samani, Maroufizadeh, Ghalen, & Navid, 2016). The obtained Cronbach’s alpha coefficient in the current study was 0.864.

2.3. Data analysis method

In the present study, continuous variables were expressed as “mean ± standard deviation (SD)” and categorical variables as “frequency (percentage)”. Simple and multiple logistic regression analyses were performed to examine the predictors of GAD symptoms. The crude and adjusted odds ratio (OR) and 95% confidence interval (CI) were calculated. Statistical analysis was performed using SPSS for windows, version 16.0 (SPSS Inc., Chicago, IL, USA), and a P < 0.05 was considered statistically significant.

2.4. Ethical consideration

This study was approved by the Ethics Committee of Tehran University of Medical Sciences, Tehran, Iran (Ethics Code: IR.TUMS.VCR.REC.1399.089), and all nursing students were fully informed about the purpose of the research and the voluntary nature of their participation.

3. Results

3.1. Participants characteristics

Table 1 shows the demographic and COVID-19-related characteristics of the nursing students. The mean age of the students was 23.07 ± 3.74 years (range: 18–43 years). Most of them were female (73.0%), single (84.5%), and BSc students (82.2%).

3.1.1. Distribution of GAD-7 total score

The mean GAD-7 total score was 6.05 ± 4.77 (range: 0–20). Distribution of scores falling within GAD-7 severity cut-offs were as follows: no anxiety, 78 (44.8%); mild, 60 (34.5%); moderate, 22 (12.6%); and severe, 14 (8.0%). Based on a cut-off value of 10, the prevalence of GAD was 20.7% (n = 36).

3.2. Factors associated with GAD

Simple and multiple logistic regression analyses were performed to identify factors associated with GAD among nursing students (see Table 2). Unadjusted analysis showed that each one-year increase in age increases the odds of GAD by 10% (ORcrude = 1.10, 95% CI: 1.01–1.20). Students with chronic diseases were 5.31 times more likely to have GAD than other participants (ORcrude = 5.31, 95% CI: 1.66–16.98). Employed nursing students were more likely to have GAD than unemployed students (ORcrude = 2.41, 95% CI: 1.00–5.78). The prevalence of GAD among MSc/PhD student was higher than the BSc students, although the difference was not statistically significant (P = 0.084). Finally, the odds of GAD increased with increasing the times of focusing on COVID-19 per a day.

Table 1 shows the demographic and COVID-19-related characteristics of the nursing students. The mean age of the students was 23.07 ± 3.74 years (range: 18–43 years). Most of them were female (73.0%), single (84.5%), and BSc students (82.2%).

3.2. Factors associated with GAD

Simple and multiple logistic regression analyses were performed to identify factors associated with GAD among nursing students (see Table 2). Unadjusted analysis showed that each one-year increase in age increases the odds of GAD by 10% (ORcrude = 1.10, 95% CI: 1.01–1.20). Students with chronic diseases were 5.31 times more likely to have GAD than other participants (ORcrude = 5.31, 95% CI: 1.66–16.98). Employed nursing students were more likely to have GAD than unemployed students (ORcrude = 2.41, 95% CI: 1.00–5.78). The prevalence of GAD among MSc/PhD student was higher than the BSc students, although the difference was not statistically significant (P = 0.084).

Finally, the odds of GAD increased with increasing the times of focusing on COVID-19 per a day.
Table 1
Demographic characteristics of the nursing students (n = 174).

| Variables                  | Prevalence, n (%) | Simple logistic regression | Multiple logistic regression |
|----------------------------|------------------|---------------------------|-----------------------------|
| Age (years)                | 23.07 ± 3.74     |                           |                             |
| Sex                        |                  |                           |                             |
| Male                       | 47 (27.0)        |                           |                             |
| Female                     | 127 (73.0)       |                           |                             |
| Marital status             |                  |                           |                             |
| Single                     | 147 (84.5)       |                           |                             |
| Married                    | 27 (15.5)        |                           |                             |
| Parent status              |                  |                           |                             |
| No child                   | 163 (93.7)       |                           |                             |
| One or more children       | 11 (6.3)         |                           |                             |
| Education                  |                  |                           |                             |
| BSc                        | 143 (82.2)       |                           |                             |
| MSc                        | 29 (16.7)        |                           |                             |
| PhD                        | 2 (1.1)          |                           |                             |
| Occupation                 |                  |                           |                             |
| No                         | 112 (64.4)       |                           |                             |
| Yes                        | 32 (18.4)        |                           |                             |
| Volunteer nurses           | 30 (17.2)        |                           |                             |
| Chronic diseases           |                  |                           |                             |
| No                         | 161 (92.5)       |                           |                             |
| Yes                        | 13 (7.5)         |                           |                             |
| Times to focus on COVID-19 per day (hours) |        |                           |                             |
| <0.5                       | 85 (48.9)        |                           |                             |
| 0.5-1                      | 36 (20.7)        |                           |                             |
| >=2                        | 36 (21.2)        |                           |                             |
| Contact with suspected or confirmed COVID-19 cases |  |                           |                             |
| No                         | 134 (77.0)       |                           |                             |
| Yes                        | 40 (23.0)        |                           |                             |
| Death of families, relatives or friends due to COVID-19 |  |                           |                             |
| No                         | 162 (93.1)       |                           |                             |
| Yes                        | 12 (6.9)         |                           |                             |

COVID-19: Coronavirus Disease 2019; SD: Standard deviation.

In adjusted analysis, GAD was significantly associated with having chronic diseases (OR\text{adj} = 5.74, 95% CI: 1.39–23.72), long time thinking about COVID-19 (>2 h per day) (OR\text{adj} = 14.09, 95% CI: 4.36–45.54), and death of family members, relatives or friends due to COVID-19 (OR\text{adj} = 4.53, 95% CI: 1.08–18.93).

4. Discussion

The main aim of the present study was to determine the prevalence of GAD among Nursing Students in Iran during the COVID-19 pandemic. The results of this study showed that GAD was significantly associated with having chronic diseases and also employed nursing students had more GAD than unemployed students. The prevalence of GAD among MSc/PhD student were higher than the BSc students. The odds of GAD increased with increasing the amount of time focusing on COVID-19 per day, death of family members, relatives or friends because of this disease.

The finding of this study showed that prevalence of GAD was 20.7%. No anxiety was 44.8%, mild anxiety was 34.5%, moderate anxiety was 12.6%, and severe anxiety was 8.0%. The anxiety prevalence in the present study is considerably higher than what was reported in the general population (Mohghanibashi-Mansourieh, 2020, Johansson, Carlbring, Hedman, Paxling, & Andersson, 2013).

The prevalence of COVID-19 disease causes harmful consequences and anxiety in people. Both nurses and nursing students experienced it but this anxiety is highest in nurses (Loh et al., 2005).

A study in Saudi Arabia was done on associated stress among medical students at a university teaching hospital during the outbreak of COVID-19 (Al-Rabiaah et al., 2020). This study showed that 77% of students had minimal anxiety, 18.4% of students had mild anxiety, 4.6% of students had moderate anxiety and none of them had severe anxiety. In our study the anxiety rate in nursing students of Iran was more than in Saudi Arabia (Al-Rabiaah et al., 2020).

Table 2
Association between GAD and demographic/COVID-19-related variables among nursing students.

| Variables                  | Crude Prevalence, n (%) | OR Crude (95% CI) | P | Adj Prevalence, n (%) | OR Adjusted (95% CI) | P |
|----------------------------|-------------------------|-------------------|---|-----------------------|----------------------|---|
| Age (years)                | –                       | 1.10 (1.01–1.20)  | 0.031 | 1.02 (0.85–1.23) | 0.807 |
| Sex                        |                         |                   |     |                       |                      |   |
| Male                       | 9 (19.1)                | 1                 |     |                       |                      |   |
| Female                     | 27 (21.3)               | 1.14 (0.49–2.64)  | 0.760 | 0.91 (0.32–2.58) | 0.861 |
| Marital status             |                         |                   |     |                       |                      |   |
| Single                     | 29 (19.7)               | 1                 |     |                       |                      |   |
| Married                    | 7 (25.9)                | 1.42 (0.55–3.69)  | 0.467 | 0.95 (0.21–4.26) | 0.951 |
| Parent status              |                         |                   |     |                       |                      |   |
| No child                   | 33 (20.2)               | 1                 |     |                       |                      |   |
| One or more children       | 3 (27.3)                | 1.48 (0.37–5.88)  | 0.580 | 0.71 (0.07–7.17) | 0.772 |
| Education                  |                         |                   |     |                       |                      |   |
| BSc                        | 26 (18.2)               | 1                 |     |                       |                      |   |
| MSc/PhD                    | 10 (32.3)               | 2.14 (0.90–5.09)  | 0.084 | 1.19 (0.31–4.57) | 0.799 |
| Occupation                 |                         |                   |     |                       |                      |   |
| No                         | 20 (17.9)               | 1                 |     |                       |                      |   |
| Yes                        | 11 (34.4)               | 2.41 (1.00–5.78)  | 0.049 | 1.80 (0.48–6.57) | 0.384 |
| Volunteer nurses           | 5 (16.7)                | 0.92 (0.31–2.70)  | 0.879 | 0.63 (0.18–2.24) | 0.476 |
| Chronic diseases           |                         |                   |     |                       |                      |   |
| No                         | 29 (18.0)               | 1                 |     |                       |                      |   |
| Yes                        | 7 (53.8)                | 5.31 (1.66–19.16) | 0.005 | 5.74 (1.93–23.72) | 0.016 |
| Times to focus on COVID-19 per day (hours) |        |                   |     |                       |                      |   |
| <0.5                       | 7 (8.2)                 | 1                 |     |                       |                      |   |
| 0.5-1                      | 6 (16.7)                | 2.23 (0.69–7.17)  | 0.179 | 2.65 (0.76–9.23) | 0.127 |
| >=2                        | 6 (28.6)                | 4.64 (1.31–15.13) | 0.017 | 3.78 (0.94–15.11) | 0.060 |
| Contact with suspected or confirmed COVID-19 cases |  |                   |     |                       |                      |   |
| No                         | 24 (17.9)               | 1                 |     |                       |                      |   |
| Yes                        | 12 (30.0)               | 1.96 (0.88–4.41)  | 0.101 | 1.11 (0.31–3.95) | 0.873 |
| Death of families, relatives or friends due to COVID-19 |  |                   |     |                       |                      |   |
| No                         | 32 (19.8)               | 1                 |     |                       |                      |   |
| Yes                        | 4 (33.3)                | 2.03 (0.58–7.17)  | 0.271 | 4.53 (1.08–18.93) | 0.039 |

COVID-19: Coronavirus Disease 2019; CI: Confidence Interval; OR: Odds Ratio.
A study in China (Wang et al., 2020) was done on immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease epidemic among the general population in China. This study showed that more than a quarter of participants experienced moderate to severe anxiety. In our study 20.7% of the sample (more than a quarter) had anxiety (Wang et al., 2020).

This study has several limitations that should be taken into account. First, the generalizability of the findings may be limited due to the web-based setting of the study. Second, the sample size was small, which may have precluded detection of significant differences due to subjects’ variability. Third, due to the cross-sectional nature of the study design, causal inferences between variables cannot be made.

5. Conclusion

The prevalence of GAD is considerably high in nursing students during the COVID-19 pandemic in Iran. Furthermore, the findings indicated that more attention needs to be paid to nursing students with chronic diseases. In all, a compressive approach, including management policies, psychosocial interventions, and training, is critical to reduce anxiety symptoms of students during COVID-19 pandemic as well as during any outbreaks of other infectious diseases in the future.

6. Consent for publication

Not applicable.

7. Availability of data and materials

The datasets used and/or analyzed during the present study are available from the corresponding author on reasonable request.

8. Authors’ contributions

Study concept and design: MH, SM, FN, HM, MA.
Acquisition, analysis, or interpretation of data: MH, SM, FN, HM, MA.
Drafting of the manuscript: MH, SM, FN, MH, MA.
Critical revision of the manuscript for important intellectual content: MH, SM, FN, MH, MA.
Statistical analysis: SM.
Obtained funding: Not Applicable.
Administrative, technical, or material support: MH, HM, FN, MA.
Study supervision: FN.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Admi, H. (1997). Nursing students’ stress during the initial clinical experience. Journal of Nursing Education, 36, 323–327.
Al-Rabiaiah, A., Temsah, M.-H., Al-Eyadhy, A. A., Hasan, G. M., Al-Zamil, F., Al-Subiaie, S., … Somyil, A. M. (2020). Middle East Respiratory Syndrome-Corona Virus (MERS-CoV) associated stress among medical students at a university teaching hospital in Saudi Arabia. Journal of Infection and Public Health, 13(5), 587–691.
Bajema, K. L., Oster, A. M., McGovern, O. L., Lindstrom, S., Stenger, M. R., Anderson, T. C., … Cha, V. T. (2020). Persons evaluated for 2019 novel coronavirus—United States, January 2020. Morbidity and Mortality Weekly Report, 69, 166.
Beck, D. L., & Srivastava, R. (1991). Perceived level and sources of stress in baccalaureate nursing students. Journal of Nursing Education, 30, 127–133.
Covid, C., & Team, R. (2020). Severe outcomes among patients with coronavirus disease 2019 (COVID-19) — United States, February 12–March 16, 2020. MMWR Morbidity and Mortality Weekly Report, 69, 343–346.
Diet, W. (2003). nutrition and the prevention of chronic diseases. Report of a joint WHO/ FAO expert consultation. WHO Technical Report Series, 916, 34–38.
Guan, W.-J., Ni, Z.-Y., Hu, Y., Liang, W.-H., Ou, C.-Q., He, J.-X., … Hui, D. S. (2020). Clinical characteristics of coronavirus disease 2019 in China. New England Journal of Medicine, 382, 1708–1720.
Yu, W., Singh, S. S., Calhoun, S., Zhang, H., Zhao, X., & Yang, F. (2018). Generalized anxiety disorder in urban China: Prevalence, awareness, and disease burden. Journal of Affective Disorders, 234, 89–96.
Johansson, R., Carlbring, P., Heideman, A., Paxling, B., & Andersson, G. (2013). Depression, anxiety and their comorbidity in the Swedish general population: point prevalence and the effect on health-related quality of life. PeerJ, 1, e98.
Li, P., Fu, J.-B., Li, K.-F., Chen, Y., Wang, H.-L., Liu, L.-J., … Tang, A. (2020). Transmission of COVID-19 in the terminal stage of incubation period: A familial cluster. International Journal of Infectious Diseases, 97, 58–62.
Li, S., Wang, Y., Xue, J., Zhao, N., & Zhu, T. (2020). The impact of COVID-19 epidemic declaration on psychological consequences: A study on active Weibo users. International Journal of Environmental Research and Public Health, 17, 2032.
Loh, L.-C., Ali, A. M., Ang, T.-H., & Chelliah, A. (2005). Impact of a spreading epidemic on medical students. The Malaysian Journal of Medical Sciences, MJMS, 12, 43.
Mohranbash-Mansouri, A. (2020). Assessing the anxiety level of Iranian general population during COVID-19 outbreak. Asian Journal of Psychiatry, 102706.
Nemati, M., Ebrahimi, B., & Nemati, F. (2020). Assessment of Iranian nurses’ knowledge and anxiety toward COVID-19 during the current outbreak in Iran. Archives of Clinical Infectious Diseases, 15.
Omane-Samani, R., Maroufizadeh, S., Ghaheri, A., & Navidi, B. (2018). Generalized Anxiety Disorder-7 (GAD-7) in people with infertility: A reliability and validity study. Middle East Fertility Society Journal, 23(4), 446–449.
Rijn, B. V., & Wild, C. (2013). Humanistic and integrative therapies for anxiety and depression: Practice-based evaluation of transactional analysis, gestalt, and integrative psychotherapies and person-centered counseling. Transactional Analysis Journal, 43(2), 150–163.
Sallam, M., Dababseh, D., Al-Haidar, A., Ababneh, N. A., Bakri, F. G., & Mahafzah, A. (2020). Conspiracy beliefs are associated with lower knowledge and higher anxiety levels regarding COVID-19 among students at the University of Jordan. medRxiv.
Spitzer, R. L., Kroenke, K., Williams, J. B., & Lowe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. Archives of Internal Medicine, 166, 1092–1097.
Tully, A. (2004). Stress, sources of stress and ways of coping among psychiatric nursing students. Journal of Psychiatric and Mental Health Nursing, 11, 43–47.
Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. International Journal of Environmental Research and Public Health, 17, 1729.
Wu, Z., & McGoogan, J. M. (2020). Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. JAMA, 323 (13), 1239. https://doi.org/10.1001/jama.2020.2648