



# The Relationship Between Health Anxiety and Caregiver Burden in Informal Caregivers of Patients with COVID-19

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## Abstract

**Background:** Irrational health anxiety increases due to insufficient information about COVID-19 and misinterpretation of allergy symptoms in favor of COVID-19. The disease increases the caregiver burden in informal caregivers and, subsequently, causes physical and mental disorders for them and negatively affects the provision of care for patients.

**Objectives:** This study aimed to examine the relationship between health anxiety and caregiver burden in informal caregivers of patients with COVID-19.

**Methods:** In this cross-sectional and correlational study, the convenient sampling method was adopted to select 340 informal caregivers of patients with COVID-19 who were discharged during the last three weeks of hospitalization in Vasei Hospital of Sabzevar City, Iran, in 2021. To collect the required data, the online links of the demographic information questionnaire, Salkoviskis's short health anxiety inventory (SHA1), and Novak and Guest's Caregiver Burden Inventory (CBI) were sent to the subjects through messengers. The data were analyzed using SPSS 22 as well as descriptive and analytical statistics.

**Results:** According to the results, the mean caregiver burden score in informal caregivers of patients with COVID-19 was  $69.72 \pm 14.91$ , and the mean health anxiety score was  $16.22 \pm 8.24$ . Pearson's test results were indicative of a significant relationship between caregiver burden and health anxiety ( $P < 0.001$ ).

**Conclusions:** Since a significant relationship was found between health anxiety and caregiver burden in informal caregivers of patients with COVID-19 in this study, it was argued that the health of informal caregivers was an important health issue certainly deserving serious attention of the health service providers.

**Keywords:** Health Anxiety, Caregiver Burden, Informal Caregivers, COVID-19

## 1. Background

Recently, people's anxiety about their health has grown as a result of the information about COVID-19 pandemic obtained from social networks, misinterpretation of seasonal allergy symptoms similar to symptoms of COVID-19, and perception of risks to the health of relatives and loved ones. Health anxiety is a spectrum that includes, on the one hand, mild concerns about getting sick and health and, on the other hand, extreme fears about health and physical symptoms (1). Health anxiety has increased significantly in recent decades, and patients with health anxiety use health care and services 41 - 78% more than patients with various medical conditions (2). Referrals to medical centers increased during the

COVID-19 pandemic due to anxiety and unreasonable concern about physical symptoms and fear of contracting this disease, which caused fatigue in medical personnel, reduced the provision of efficient healthcare services to patients in need, and increased the risk of infection with COVID-19 (3). Continuous and excessive health anxiety causes disturbances in family and social relationships as well as increases the costs of medical care (4). Informal caregivers are those who provide unpaid care to their friends and family with various illnesses or disabilities. Therefore, they are essential components in patient care (5). Caregivers are negatively affected by living with patients who suffer from illnesses and their complications, managing their care and emotional reactions, and treating them (6). Moreover, distress caused by quarantine during

the COVID-19 pandemic (e.g., fear of infection, lack of sufficient information and resources, long-term isolation, financial problems, frustration, impatience, and labeling of the disease by people) increased the pressure and mental health problems (7).

Caregiver burden refers to the level of caregivers' understanding of their physical or mental health and financial and social life as the suffering caused by caring for their relatives (8). Due to the nature of caregiving, caregivers are at risk of a range of physical disorders such as fatigue, difficulty in sleeping, weak immune system function, cardiovascular diseases, and a 63% increase in mortality (9). High caregiver burden is associated with consequences such as patient abandonment, insufficient patient care, reduced quality of life, increased depression, insufficient attention to one's health, and feelings of personal isolation (10). Caregiver burden is a problematic issue for the family and the patient, causing pain and suffering for the caregiver and the patient since it is hidden and not recognized as a disease (11).

The results of the study by Saeedi et al. showed that employees working in health centers in Iran had high health anxiety (12). The results of the study by Benke et al. indicated that individuals with high levels of health anxiety were prone to fearful mental imagery of contracting COVID-19, which might have been crucial factor contributing to the exacerbation and chronicity of excessive health anxiety in times of a pandemic (13). The findings from the study by Nakamoto et al. demonstrated that more than half of the caregivers reported an increased caregiver burden, and that the increased caregiver burden was associated with SPD during the pandemic (14).

Kazan Kizilkurt et al. revealed that using social networks, following the news of the COVID-19 pandemic, self-perception, and the level of hopelessness were the main predictors of health anxiety (15). Cohen et al. also showed that the increase in caregiver burden due to COVID-19 was associated with an increase in the intensity of care, and that many caregivers experienced an increased caregiver burden and intensity since the outbreak of COVID-19 (16). Since informal caregivers are in direct contact with patients with COVID-19, are aware of their suffering as well as the signs and symptoms of their disease, and do not have enough information and skills to care for them, they experience a strong fear of contracting the disease and varying degrees of health anxiety. This may create caregiver burden, prevent adequate patient care, and place financial burden on the family and health system. The relationship between health anxiety and different subscales of caregiver burden has not received research attention so far. Accordingly, determining the relationship between health anxiety as one of the

complications of COVID-19 and caregiver burden and its different subscales as well as identifying the factors affecting these two parameters may positively contribute to developing strategies to deal with the consequences of COVID-19 for caregivers.

## 2. Objectives

This study aimed to examine the relationship between health anxiety and care burden in informal caregivers of patients with COVID-19 in 2021.

## 3. Methods

### 3.1. Study Design and Setting

In this cross-sectional and correlational study, the convenient sampling method was employed to select 340 informal caregivers of patients with COVID-19 who were discharged during the last three weeks of hospitalization in Vasei Hospital in Sabzevar City, Iran, between July 23 and November 6, 2021.

### 3.2. Participants

The sample size of this study was calculated based on a study by Mousavi et al. (17) in which the prevalence of health anxiety was reported as 33.7%. Therefore, the sample size was determined to be 374 based on the following formula with a confidence factor of 95%, an error rate of 0.05, and a loss of 10%:

$$n = \frac{z_{1-\frac{\alpha}{2}}^2 p (1 - p)}{d^2}$$

The inclusion criteria were willingness to participate in the study, reading and writing literacy, not having an active COVID-19, not having mental disorders, not taking psychiatric drugs, not being addicted, having access to a smartphone, and not being a professional caregiver (i.e., not working as a health and medical personnel). The exclusion criteria, on the other hand, were unwillingness to participate in the study, non-cooperation in completing the questionnaires, and completion of the questionnaires randomly or inappropriately.

### 3.3. Measurements

Data collection tools were: (1) A demographic information questionnaire; (2) Salkovskis's short health anxiety inventory (SHA-I); and (3) Novak and Guest's Caregiver Burden Inventory (CBI).

(1) The demographic questionnaire included general information such as sexuality, marital status, educational level, occupational status, relation to the patient, living

with the patient, access to an alternative caregiver, affliction with chronic diseases, insurance status, parental status, age, hours of care per week, the average hours following the news on COVID-19 during the last two weeks, and monthly income.

(2) Salkovskis's short health anxiety inventory (SHAI) included 18 questions about contracting the disease (questions 5, 6, 8, 9, 11, and 12), general health concerns (questions 1, 2, 3, 4, 7, 10, and 14), and consequences of the disease (questions 13, 15, 16, 17, and 18) with each item including four options, and each option including an individual's description of the components of health and disease in the form of a declarative sentence. The participants had to choose one sentence offering the best description for them. Each item was scored from 0 to 3. Options A, B, C, and D had scores of 0, 1, 2, and 3, respectively. The overall score was between 0 and 54, so a higher score was indicative of a higher health anxiety (18). The validity and reliability of the Persian version of the inventory were already measured by Nargesi et al. and its Cronbach's alpha coefficient was reported as 75% (19). The reliability of the inventory was 85% based on Cronbach's alpha in this study.

(3) Novak and Guest's Caregiver Burden Inventory (CBI) contains 24 items that examine five subscales (i.e., time-dependent care burden/questions 1 - 5, developmental care burden/questions 6 - 10, physical care burden/questions 11 - 14, social care burden/questions 15 - 19, and emotional care burden/questions 20 - 24) (20). Caregivers' responses were measured based on a 5-point Likert scale (strongly disagree to strongly agree), so that the participants selected one of the responses of strongly disagree (score 1), disagree (score 2), neutral (score 3), agree (score 4), and strongly agree (score 5) to answer each question. Accordingly, the scores of the inventory ranged from 24 to 120, with scores of 24 to 47 indicating mild caregiver burden, 48 to 71 indicating moderate caregiver burden, 72 to 95 indicating severe caregiver burden, and 96 to 120 indicating very severe caregiver burden (21). The validity and reliability of the Persian version of the inventory were already measured by Shafiezadeh et al. Cronbach's alpha of the subscales was 93%, and the test-retest reliability coefficient of the intraclass correlation index was 96% at a two-week interval (22). The reliability of the inventory was 91% based on Cronbach's alpha coefficient in this study.

The researcher attended the Medical Records Unit of Vasei Hospital in Sabzevar and received the list of the names and contact numbers of patients who were discharged from the hospital in the last three weeks after approving the research project and receiving the code of ethics from the Ethics Committee of Sabzevar University

of Medical Sciences. The caregivers of the patients were identified and informed of the study procedures and objectives in phone conversation. The links of the online questionnaires were shared with the procedures through common internal and external messengers (Soroush, WhatsApp, and Telegram), and they were asked to complete them honestly and carefully if they already met the inclusion criteria. Participants were provided with a contact number to contact the research team for receiving guidance to sort out possible problems while completing the questionnaires, and were also given one week to complete the questionnaires. Participants who failed to complete the questionnaires were contacted and those unwilling to continue cooperation were excluded from the study after one-week deadline.

#### 3.4. Statistical Analysis

The collected data were analyzed in SPSS 22 software using descriptive statistics (e.g., mean, standard deviation, and frequency distribution of variables) and tests (e.g., *t*-test, one-way ANOVA, Pearson's correlation, and linear regression). The normal distribution of the data was checked performing the Kolmogorov-Smirnov test. The significance level in the tests was  $P \leq 0.05$ .

#### 3.5. Ethical Considerations

The present study was approved by the Ethics Committee of Sabzevar University of Medical Sciences (IR.MEDSAB.REC.1400.062). All necessary permissions for conducting the research were obtained from the relevant administrators, and all methods were performed in accordance with the relevant guidelines and regulations. Then the patients were provided with information about voluntary participation in the study and the possibility of exclusion from the study in case of unwillingness to continue cooperation, and were assured of the confidentiality of the information.

## 4. Results

The data of 340 caregivers were analyzed, and 34 questionnaires were excluded due to missing data. Out of 340 caregivers, 234 (68.8%) were female, and 102 (31.2%) were male. Most of the caregivers [i.e., 182 (53.5%)] were single, most of them [i.e., 193 (56.8%)] had degrees higher than a high-school diploma, most of them [i.e., 165 (48.5%)] were unemployed, and 94 (27.6%) of them were children of patients. The mean age of the caregivers was  $31.5 \pm 10.67$ . According to our results, the caregiver burden decreased with an increase in education level ( $P = 0.022$ ) (Table 1).

**Table 1.** Examining the Relationship Between Caregiver Burden and Health Anxiety Using Qualitative Variables in Informal Caregivers of Patients with COVID-19

Variables	No. (%)	Mean $\pm$ SD	
		Caregiver Burden	Health Anxiety
<b>Sexuality</b>			
Female	234 (68.8)	69.89 $\pm$ 14.48	16.50 $\pm$ 7.98
Male	106 (31.2)	69.36 $\pm$ 15.89	15.62 $\pm$ 9.08
P-value		0.768	0.395
<b>Marital status</b>			
Married	158 (46.5)	69.86 $\pm$ 15.55	16.27 $\pm$ 8.68
Single	182 (53.5)	69.61 $\pm$ 14.38	16.18 $\pm$ 8.05
P-value		0.877	0.921
<b>Educational level</b>			
Elementary	16 (4.7)	70.31 $\pm$ 15.41	12.94 $\pm$ 7.61
Middle school	33 (9.7)	70.06 $\pm$ 12.44	18.12 $\pm$ 8.71
Diploma	98 (28.8)	72.89 $\pm$ 15.18	17.28 $\pm$ 8.54
Above diploma	193 (56.8)	67.67 $\pm$ 14.86	15.64 $\pm$ 8.14
P-value		0.022	0.081
<b>Occupational status</b>			
Retired	20 (5.9)	68.25 $\pm$ 9.36	18.05 $\pm$ 8.61
Employer	155 (45.6)	68.79 $\pm$ 16.03	15.49 $\pm$ 8.58
Unemployed	193 (48.5)	70.78 $\pm$ 14.36	16.70 $\pm$ 8.05
P-value		0.447	0.263
<b>Relation to the patient</b>			
Parent	64 (18.8)	68.97 $\pm$ 13.33	16.34 $\pm$ 7.60
Son / Daughter	94 (27.6)	69.10 $\pm$ 16.64	16.68 $\pm$ 9.00
Brother	15 (4.4)	71.13 $\pm$ 13.32	15.40 $\pm$ 6.48
Sister	21 (6.2)	69.00 $\pm$ 17.25	15.00 $\pm$ 7.19
Spouse	52 (15.3)	69.79 $\pm$ 15.81	15.35 $\pm$ 9.73
Others	94 (27.6)	70.77 $\pm$ 13.53	16.57 $\pm$ 7.92
P-value		0.965	0.898
<b>Living with patient</b>			
Yes	190 (55.9)	70.00 $\pm$ 15.51	16.31 $\pm$ 8.64
No	150 (44.1)	69.38 $\pm$ 14.17	16.12 $\pm$ 7.97
P-value		0.701	0.838
<b>Access to alternative caregivers</b>			
Yes	208 (61.2)	69.29 $\pm$ 15.28	16.84 $\pm$ 8.42
No	132 (38.8)	70.42 $\pm$ 14.35	15.25 $\pm$ 8.13
P-value		0.491	0.084
<b>Having a chronic disease</b>			
Yes	81 (23.8)	72.27 $\pm$ 15.46	16.83 $\pm$ 8.45
No	259 (76.2)	68.93 $\pm$ 14.68	16.03 $\pm$ 8.31
P-value		0.088	0.461
<b>Having insurance</b>			
Yes	283 (83.2)	69.53 $\pm$ 15.06	16.03 $\pm$ 8.13
No	57 (16.8)	70.68 $\pm$ 14.28	17.18 $\pm$ 9.31
P-value		0.584	0.391
<b>Being a parent</b>			
Yes	129 (37.9)	69.28 $\pm$ 15.48	15.71 $\pm$ 8.63
No	211 (62.1)	70.00 $\pm$ 14.59	16.54 $\pm$ 8.15
P-value		0.671	0.378

The mean total caregiver burden was  $69.72 \pm 14.91$ , the time-dependent care burden with a mean of  $16.8 \pm 4.06$  had the highest score, and physical care burden with a mean of  $11.9 \pm 3.46$  had the lowest score among other subscales of caregiver burden. The mean total health anxiety was  $16.22 \pm 8.24$ , the total health concern with a mean of  $7.09 \pm 3.61$  had the highest score, and contracting the disease with a mean of  $4.47 \pm 3.35$  had the lowest score among other subscales of health anxiety (Table 2).

According to results of Pearson's test, there was an inverse correlation between income level with health anxiety ( $P = 0.007$ ) and caregiver burden ( $P = 0.162$ ) and age with health anxiety ( $P = 0.457$ ). Furthermore, hours of care was found to positively correlate with caregiver burden ( $P = 0.060$ ) and health anxiety ( $P = 0.301$ ), and average Hour of Tracking COVID-19 News was detected to correlate with caregiver burden ( $P = 0.074$ ) and health anxiety ( $P = 0.304$ ) (Table 3).

The results of Pearson's test also revealed a positive correlation of 0.376 between caregiver burden and health anxiety ( $P < 0.001$ ), and showed a significant positive correlation between the subscales of caregiver burden and health anxiety (Table 4).

Among all demographic variables, according to the results of regression model, income and access to an alternative caregiver predicted 4.5% of health anxiety ( $P = 0.001$ ), and income and education level predicted 5.7% of care burden ( $P = 0.000$ ) (Table 5).

## 5. Discussion

Informal caregivers faced numerous physical, psychological, and social challenges during the COVID-19 pandemic due to a lack of adequate support for them as well as concerns over their health and over that of their patients (23). This study aimed to examine the relationship between health anxiety and caregiver burden in informal caregivers of patients with COVID-19.

Our results showed that most caregivers were females (24-26), indicating the key role played by females in caregiving in most societies, which were line with the results of other studies. Iranian females, in addition to doing housework, take care of children, adults, and patients due to the dominant culture of society.

Among the subscales of caregiver burden, time-dependent care burden received the highest score, which was consistent with the findings from other studies on caregivers of patients with COVID-19 (27) and other patients (28, 29). This subscale reflects the time caregivers spend to care for patients. Caregivers have to spend considerable time since patients depend on them to

manage treatment, do household chores, and perform social activities.

According to our study results, caregivers experienced a moderate caregiver burden, which was consistent with the findings from the studies by MacLeod et al. in America (30) and Mirzaei et al. in Iran (31) but was inconsistent with the results of the study by Noguchi et al. in Japan (32). This inconsistency may have been attributed to the different types of the disease and study as well as the support, training, and equipment that the health systems of the given countries provided to caregivers.

Our results suggested that the caregiver burden decreased with an increase in the education level, which was consistent with the findings from the studies by Akkuş et al. (33) and Eskin et al. (34) on caregivers of patients with cancer. A higher education level is associated with an increased awareness about the disease and with the required measures adopted for delivering proper care, thus reducing the caregiver burden.

The mean health anxiety score of the caregivers was 16.22 in this study. This score for ordinary people was 15.1 (35) during COVID-19 pandemic and 10 - 11 (36) before it. The results showed that the health anxiety score increased in the people with a close encounter with this disease. The results also indicated that health anxiety decreased as income increased, which was consistent with the results of studies by Chen et al. (37) and Lou et al. (38). This may have been attributed to the caregivers' easier access to expensive facilities, equipment, and drugs needed to treat and support patients.

According to our study results, health anxiety increased as the caregiver burden increased. In a study by Safaeian et al. it was found that greater caregiver burden was associated with increased anxiety in caregivers of cancer patients (39). In a study on caregivers of individuals aged under 18 years, moreover, Russell demonstrated that a great caregiver burden was associated with increased general anxiety (7). A heavy caregiver burden reduces caregivers' ability to effectively deal with the problems and pressures caused by care and, consequently, increases the stress and anxiety about their health and their patients.

The outbreak of COVID-19 has led to adverse economic, social, and health consequences in different countries (3). The results of the present study showed that physical care burden had the lowest score among other dimensions of care burden, which was inconsistent with the results of studies by Senmar et al. (40) and Sharma et al. (41) suggesting that caregivers bore enormous psychological and physical burden. The inconsistency may have been due to the fact that very limited time is needed to care for patients with COVID-19, while a great deal of time and even years are required to care for dialysis patients. In

**Table 2.** Mean and Standard Deviation of Caregiver Burden and Health Anxiety and Their Subscales in Informal Caregivers of Patients with COVID-19

Variables	Mean ± SD	Min	Max
<b>Time-dependence burden</b>	16.8 ± 4.06	5	25
<b>Developmental burden</b>	14.9 ± 4.07	5	25
<b>Physical burden</b>	11.9 ± 3.46	4	20
<b>Social burden</b>	12.22 ± 3.97	0	25
<b>Emotional burden</b>	13.93 ± 4.9	5	25
<b>Total Caregiver burden</b>	69.72 ± 14.91	24	120
<b>General health concerns</b>	7.09 ± 3.61	0	21
<b>Contracting the disease</b>	4.47 ± 3.35	0	18
<b>Consequences of the disease</b>	4.66 ± 2.73	0	15
<b>Total health anxiety</b>	16.22 ± 8.24	0	54

**Table 3.** Investigating the Relationship of Quantitative Variables with Caregiving Burden and Health Anxiety in Informal Caregivers of Patients with COVID-19

Variables	Total Mean of Caregiver Burden	Total Mean of Health Anxiety
<b>Age</b>		
Pearson correlation coefficient	0.023	-0.040
P-value	0.668	0.457
<b>Hours of care per week</b>		
Pearson correlation coefficient	0.102	0.056
P-value	0.060	0.301
<b>Average hour of tracking COVID-19 news (last two weeks)</b>		
Pearson correlation coefficient	0.097	0.056
P-value	0.074	0.304
<b>Income level (monthly)</b>		
Pearson correlation coefficient	-0.080	-0.152
P-value	0.162	0.007

**Table 4.** Correlation of Caregiver Burden and Its Different Subscales with Health Anxiety and its Subscales in Informal Caregivers of Patients with COVID-19

CBS	HAS			
	General Health Concerns	Contracting the Disease	Consequences of the Disease	Total Health Anxiety
<b>Time-dependence burden</b>	0.182 <sup>b</sup>	0.140 <sup>b</sup>	0.114 <sup>a</sup>	0.210 <sup>b</sup>
<b>Developmental burden</b>	0.265 <sup>b</sup>	0.295 <sup>b</sup>	0.221 <sup>b</sup>	0.185 <sup>b</sup>
<b>Physical burden</b>	0.317 <sup>b</sup>	0.300 <sup>b</sup>	0.284 <sup>b</sup>	0.243 <sup>b</sup>
<b>Social burden</b>	0.361 <sup>b</sup>	0.306 <sup>b</sup>	0.347 <sup>b</sup>	0.279 <sup>b</sup>
<b>Emotional burden</b>	0.330 <sup>b</sup>	0.283 <sup>b</sup>	0.304 <sup>b</sup>	0.267 <sup>b</sup>
<b>Total caregiver burden</b>	0.308 <sup>b</sup>	0.329 <sup>b</sup>	0.338 <sup>b</sup>	0.376 <sup>b</sup>

Abbreviations: CBS, caregiver burden subscales; HAS, health anxiety subscales.

<sup>a</sup> P < 0.05.

<sup>b</sup> P < 0.01.

addition, strong family affection among Iranian families encourages the caregivers to do their best to take care of the patient, and, therefore, they are less likely to report

their physical burden. The results of the study showed that female participants carried a greater care burden than male ones, but the difference was not statistically



**Table 5.** Results of Regression Model to Predict Health Anxiety and Caregiver Burden in Informal Caregivers of Patients with COVID-19

Main and Effective Variables	Beta	P	R <sup>2</sup>	Adjusted R <sup>2</sup>	Adjusted F	P
<b>Health anxiety</b>			0.054	0.045	5.813	0.001
Income level	-0.351	0.001				
Access to alternative caregivers	-1.804	0.069				
<b>Caregiver burden</b>			0.066	0.057	7.180	0.000
Income level	-0.326	0.082				
Educational level	-2.199	0.027				

significant, which was not consistent with the results of the studies by Mirzaei et al. (31) and Rahimi et al. (42). This inconsistency may have been attributable to the fact that majority of the participants in our study were single females and did not have additional social responsibilities such as serving the husband and children.

### 5.1. Limitations

This study faced some limitations, including non-cooperation of some caregivers, return of incomplete questionnaires by some caregivers, selection of a medical center for sampling, and adoption of convenient sampling. Therefore, it was recommended that future studies should be conducted in several treatment centers by adopting random sampling method.

### 5.2. Conclusions

In sum, informal caregivers faced numerous physical, psychological, and social challenges during the COVID-19 pandemic due to a lack of enough knowledge of patient care, which was found to place a heavy caregiver burden on them and increase their health anxiety. As the result, the general health of caregivers and the effective care of patients were affected. It was also determined that the health of informal caregivers was an important health issue, and that the caregivers were in need of support from health organizations, society, and family members.

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### Footnotes

**Authors' Contribution:** Hamid Barghbani contributed to the conception, design, literature search, data acquisition, analysis, and interpretation of data, as well as the drafting of the manuscript. Yeganeh Salehi contributed to the conception, design, and drafting of the manuscript. Rouhollah Barghbani contributed to the literature search, data acquisition, analysis, and interpretation of data. Mostafa Rad contributed to the conception, design, literature search, data acquisition, analysis, and interpretation of data, drafting of the manuscript, and critical revision of the manuscript for important intellectual content.

**Conflict of Interests:** The authors declare that they have no conflict of interest.

**Data Reproducibility:** The data presented in this study are openly available in one of the repositories or will be available on request from the corresponding author by this journal representative at any time during submission or after publication. Otherwise, all the consequences of possible withdrawal or future retraction will be with the corresponding author.

**Ethical Approval:** This study was the result of a research project approved by the Student Research Committee of Sabzevar University of Medical Sciences under number 400062 and the code of ethics [IR.MEDSAB.REC.1400.062](#).

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### References

1. Taylor S. *The Psychology of Pandemics: Preparing for the Next Global Outbreak of Infectious Disease*. Newcastle upon Tyne, UK: Cambridge Scholars Publishing; 2019.

2. Axelsson E, Hedman-Lagerlof E. Cognitive behavior therapy for health anxiety: systematic review and meta-analysis of clinical efficacy and health economic outcomes. *Expert Rev Pharmacoecon Outcomes Res.* 2019;**19**(6):663-76. [PubMed ID: 31859542]. <https://doi.org/10.1080/14737167.2019.1703182>.
3. Bagheri Sheykhangafshe F, Tajbakhsh K, Abolghasemi A. [Comparison of COVID-19 Anxiety, Coping Styles and Health Anxiety in Athletic and Non-Athletic Students]. *Sport Psychol Stud.* 2020;**9**(32):283-306. Persian. <https://doi.org/10.22089/spsyj.2020.9377.2027>.
4. Newby JM, Hobbs MJ, Mahoney AEJ, Wong SK, Andrews G. DSM-5 illness anxiety disorder and somatic symptom disorder: Comorbidity, correlates, and overlap with DSM-IV hypochondriasis. *J Psychosom Res.* 2017;**101**:31-7. [PubMed ID: 28867421]. <https://doi.org/10.1016/j.jpsychores.2017.07.010>.
5. Gerain P, Zech E. Informal Caregiver Burnout? Development of a Theoretical Framework to Understand the Impact of Caregiving. *Front Psychol.* 2019;**10**:1748. [PubMed ID: 31428015]. [PubMed Central ID: PMC6689954]. <https://doi.org/10.3389/fpsyg.2019.01748>.
6. Al-Daken LI, Ahmad MM. Predictors of burden and quality of sleep among family caregivers of patients with cancer. *Support Care Cancer.* 2018;**26**(11):3967-73. [PubMed ID: 29804204]. <https://doi.org/10.1007/s00520-018-4287-x>.
7. Russell BS, Hutchison M, Tambling R, Tomkunus AJ, Horton AL. Initial Challenges of Caregiving During COVID-19: Caregiver Burden, Mental Health, and the Parent-Child Relationship. *Child Psychiatry Hum Dev.* 2020;**51**(5):671-82. [PubMed ID: 32749568]. [PubMed Central ID: PMC7398861]. <https://doi.org/10.1007/s10578-020-01037-x>.
8. Zarit SH, Todd PA, Zarit JM. Subjective burden of husbands and wives as caregivers: a longitudinal study. *Gerontologist.* 1986;**26**(3):260-6. [PubMed ID: 3721233]. <https://doi.org/10.1093/geront/26.3.260>.
9. Teixeira RJ, Applebaum AJ, Bhatia S, Brandao T. The impact of coping strategies of cancer caregivers on psychophysiological outcomes: an integrative review. *Psychol Res Behav Manag.* 2018;**11**:207-15. [PubMed ID: 29872357]. [PubMed Central ID: PMC5973462]. <https://doi.org/10.2147/PRBM.S164946>.
10. Hiseman JP, Fackrell R. Caregiver Burden and the Nonmotor Symptoms of Parkinson's Disease. *Int Rev Neurobiol.* 2017;**133**:479-97. [PubMed ID: 28802929]. <https://doi.org/10.1016/bs.irn.2017.05.035>.
11. Milbury K, Badr H, Fossella F, Pisters KM, Carmack CL. Longitudinal associations between caregiver burden and patient and spouse distress in couples coping with lung cancer. *Support Care Cancer.* 2013;**21**(9):2371-9. [PubMed ID: 23546537]. [PubMed Central ID: PMC4428561]. <https://doi.org/10.1007/s00520-013-1795-6>.
12. Saeedi M, Yazdi S, Bahador RC. Predictors of COVID-19-related health anxiety among health care workers: a cross-sectional study. *BMC Psychol.* 2022;**10**(1):170. [PubMed ID: 35821065]. [PubMed Central ID: PMC9277796]. <https://doi.org/10.1186/s40359-022-00880-y>.
13. Benke C, Schonborn T, Habermann N, Pane-Farre CA. Health anxiety is associated with fearful imagery of contracting COVID-19: An experimental study. *J Affect Disord.* 2022;**298**(Pt A):316-21. [PubMed ID: 34763031]. [PubMed Central ID: PMC8574074]. <https://doi.org/10.1016/j.jad.2021.11.014>.
14. Nakamoto I, Murayama H, Takase M, Muto Y, Saito T, Tabuchi T. Association between increased caregiver burden and severe psychological distress for informal caregivers during the COVID-19 pandemic in Japan: A cross-sectional study. *Arch Gerontol Geriatr.* 2022;**102**:104756. [PubMed ID: 35779345]. [PubMed Central ID: PMC9214660]. <https://doi.org/10.1016/j.archger.2022.104756>.
15. Kazan Kizilkurt O, Yilmaz A, Noyan CO, Dilbaz N. Health anxiety during the early phases of COVID-19 pandemic in Turkey and its relationship with postpandemic attitudes, hopelessness, and psychological resilience. *Perspect Psychiatr Care.* 2021;**57**(1):399-407. [PubMed ID: 33073870]. <https://doi.org/10.1111/ppc.12646>.
16. Cohen SA, Kunicki Z, Drohan MM, Greaney ML. Exploring Changes in Caregiver Burden and Caregiving Intensity due to COVID-19. *Gerontol Geriatr Med.* 2021;**7**:2333721421999280. [PubMed ID: 33718523]. [PubMed Central ID: PMC7919204]. <https://doi.org/10.1177/2333721421999280>.
17. Mousavi SM, Yazdanirad S, Sadeghian M, Abbasi M, Jahadi Naeini M. [Relationship between Resilience and Hypochondriasis due to COVID-19: A Case Study in an Occupational Environment]. *J Occup Hyg Eng.* 2021;**7**(4):35-43. Persian.
18. Salkovskis PM, Rimes KA, Warwick HM, Clark DM. The Health Anxiety Inventory: development and validation of scales for the measurement of health anxiety and hypochondriasis. *Psychol Med.* 2002;**32**(5):843-53. [PubMed ID: 12171378]. <https://doi.org/10.1017/S0033291702005822>.
19. Nargesi F, Izadi F, Karimejad K, Rezaii Sharif A. [The investigation of the reliability and validity of Persian version of Health anxiety questionnaire in students of Lorestan University of Medical Sciences]. *Quarterly of Educational Measurement.* 2017;**7**(27). Persian.
20. Novak M, Guest C. Application of a multidimensional caregiver burden inventory. *Gerontologist.* 1989;**29**(6):798-803. [PubMed ID: 2516000]. <https://doi.org/10.1093/geront/29.6.798>.
21. Haghgoo A, Zoladl M, Afroughi S, Rahimian H, Mirzaee MS. [Assessment of the Burden on Family Caregivers of Patients with Mental Disorders Hospitalized in Shahid Rajai Hospital in Yasuj, 2016]. *Iran J Psychiatry Nurs.* 2017;**5**(2):39-44. Persian. <https://doi.org/10.21859/ijpn-05026>.
22. Shafieazadeh A, Heravi-Karimooi M, Mirzaee A, Rejeh N, Sharif Nia H, Montazeri A. Psychometric characteristics of the Iranian Caregiver Burden Inventory (CBI) in caregivers of elderly patients with Alzheimer. *Health Qual Life Outcomes.* 2020;**18**(1):255. [PubMed ID: 32727503]. [PubMed Central ID: PMC7391597]. <https://doi.org/10.1186/s12955-020-01509-7>.
23. Budnick A, Hering C, Eggert S, Teubner C, Suhr R, Kuhlmeier A, et al. Informal caregivers during the COVID-19 pandemic perceive additional burden: findings from an ad-hoc survey in Germany. *BMC Health Serv Res.* 2021;**21**(1):353. [PubMed ID: 33863337]. [PubMed Central ID: PMC8050992]. <https://doi.org/10.1186/s12913-021-06359-7>.
24. Otake Y, Kimura Y, Suzuki M, Koyama S, Kojima I, Yamada M. Factors Associated with Increased Caregiver Burden of Informal Caregivers during the COVID-19 Pandemic in Japan. *J Nutr Health Aging.* 2022;**26**(2):157-60. [PubMed ID: 35166308]. [PubMed Central ID: PMC8783575]. <https://doi.org/10.1007/s12603-022-1730-y>.
25. Tsapanou A, Papatriantafyllou JD, Yiannopoulou K, Sali D, Kalligerou F, Ntanas E, et al. The impact of COVID-19 pandemic on people with mild cognitive impairment/dementia and on their caregivers. *Int J Geriatr Psychiatry.* 2021;**36**(4):583-7. [PubMed ID: 33166418]. <https://doi.org/10.1002/gps.5457>.
26. Leggett AN, Carmichael A, Leonard N, Jackson J, Kirsh M, Solway E, et al. Care Challenges Due to COVID-19 and Mental Health Among Caregivers of U.S. Adults With a Chronic or Disabling Condition. *Innov Aging.* 2021;**5**(3):igab031. [PubMed ID: 34632106]. [PubMed Central ID: PMC8493889]. <https://doi.org/10.1093/geroni/igab031>.
27. Sheikhbardsiri H, Tavan A, Afshar PJ, Salahi S, Heidari-Jamebozorgi M. Investigating the burden of disease dimensions (time-dependent, developmental, physical, social and emotional) among family caregivers with COVID-19 patients in Iran. *BMC Prim Care.* 2022;**23**(1):165. [PubMed ID: 35773628]. [PubMed Central ID: PMC9247935]. <https://doi.org/10.1186/s12875-022-01772-1>.
28. Braich PS, Lal V, Hollands S, Almeida DR. Burden and depression in the caregivers of blind patients in India. *Ophthalmology.* 2012;**119**(2):221-6. [PubMed ID: 22035578]. <https://doi.org/10.1016/j.ophtha.2011.07.038>.
29. Miyashita M, Narita Y, Sakamoto A, Kawada N, Akiyama M, Kayama M, et al. Care burden and depression in caregivers caring for patients with intractable neurological diseases at home in Japan. *J Neurol Sci.* 2009;**276**(1-2):148-52. [PubMed ID: 18954877]. <https://doi.org/10.1016/j.jns.2008.09.022>.
30. MacLeod S, Tkatch R, Kraemer S, Fellows A, McGinn M, Schaeffer J, et al. The Impact of COVID-19 on Informal Caregivers in the US. *Int J Aging Res.* 2021;**4**(3).



31. Mirzaei A, Raesi R, Saghari S, Raei M. Evaluation of Family Caregiver Burden among COVID-19 Patients. *Open Public Health J.* 2020;**13**(1):808-14. <https://doi.org/10.2174/1874944502013010808>.
32. Noguchi T, Hayashi T, Kubo Y, Tomiyama N, Ochi A, Hayashi H. Association between family caregivers and depressive symptoms among community-dwelling older adults in Japan: A cross-sectional study during the COVID-19 pandemic. *Arch Gerontol Geriatr.* 2021;**96**:104468. [PubMed ID: 34225097]. [PubMed Central ID: PMC8590949]. <https://doi.org/10.1016/j.archger.2021.104468>.
33. Akkus Y, Karacan Y, Unlu K, Deniz M, Parlak A. The effect of anxiety and spiritual well-being on the care burden of caregivers of cancer patients during the COVID-19 pandemic. *Support Care Cancer.* 2022;**30**(2):1863-72. [PubMed ID: 34613473]. [PubMed Central ID: PMC8493049]. <https://doi.org/10.1007/s00520-021-06611-0>.
34. Eskin SG, Yuksel R, Bulut H. Investigation of the Relationship between Care Giving Burden and Quality of Life of Caregivers of Cancer Patients. *J Evol Med Dent Sci.* 2021;**10**(9):567-72. <https://doi.org/10.14260/jemds/2021/123>.
35. Ozdin S, Bayrak Ozdin S. Levels and predictors of anxiety, depression and health anxiety during COVID-19 pandemic in Turkish society: The importance of gender. *Int J Soc Psychiatry.* 2020;**66**(5):504-11. [PubMed ID: 32380879]. [PubMed Central ID: PMC7405629]. <https://doi.org/10.1177/0020764020927051>.
36. Te Poel F, Hartmann T, Baumgartner SE, Tanis M. A psychometric evaluation of the Dutch Short Health Anxiety Inventory in the general population. *Psychol Assess.* 2017;**29**(2):186-98. [PubMed ID: 27176129]. <https://doi.org/10.1037/pas0000332>.
37. Chen Q, Zhang Y, Zhuang D, Mao X, Mi G, Wang D, et al. Health anxiety in medical employees: A multicentre study. *J Int Med Res.* 2019;**47**(10):4854-61. [PubMed ID: 31638465]. [PubMed Central ID: PMC6997781]. <https://doi.org/10.1177/0300060519872310>.
38. Luo J, Wang P, Li Z, Cao W, Liu H, Meng L, et al. Health Anxiety and Its Correlates in the General Chinese Population During the COVID-19 Epidemic. *Front Psychiatry.* 2021;**12**:743409. [PubMed ID: 34880789]. [PubMed Central ID: PMC8645575]. <https://doi.org/10.3389/fpsy.2021.743409>.
39. Safaeian Z, Sadat Hejazi S, Delavar E, Hoseini Azizi T, HaresAbadi M. [The Relationship between Caregiver Burden, and Depression, Anxiety and Stress in Family Caregivers of Cancer Patients Referred to Imam Reza Hospital in Bojnurd City]. *Iran J Psychiatry Nurs.* 2017;**5**(3):7-14. Persian. <https://doi.org/10.21859/ijpn-05032>.
40. Senmar M, Rafiei H, Yousefi F, Razaghpoor A, Bokharaei M. Caregiver burden among family caregivers of older patients receiving hemodialysis and its relevant factors. *J Nephroarmacology.* 2019;**8**(1):12. <https://doi.org/10.15171/npj.2019.12>.
41. Sharma M, Lakhara P, Kumar Sharma S, Jelly P, Sharma R. The Burden of Caregivers of Patients Undergoing Hemodialysis. *J Holist Nurs Midwifery.* 2021;**31**(2):69-75. <https://doi.org/10.32598/jhnm.31.2.2089>.
42. Rahimi T, Dastyar N, Rafati F. Experiences of family caregivers of patients with COVID-19. *BMC Fam Pract.* 2021;**22**(1):137. [PubMed ID: 34187368]. [PubMed Central ID: PMC8241402]. <https://doi.org/10.1186/s12875-021-01489-7>.