

The impact of pre-existing conditions and perceived health status on mental health during the COVID-19 pandemic

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ABSTRACT

Background Patients with pre-existing conditions and poor health status are vulnerable for adverse health sequelae during the COVID-19 pandemic. We investigated the association of pre-existing medical conditions and self-perceived health status with the risk of mental health complications during the COVID-19 pandemic.

Methods In October–December, 2020, 1036 respondents completed online survey that included assessment of pre-existing conditions, self-perceived health status, depressive (Patient Health Questionnaire-8 score ≥ 10), anxiety (Generalized Anxiety Disorders-7 score ≥ 10) and post-traumatic stress (Impact of Events Scale Revised) symptoms, alcohol use (AUDIT), and COVID-19 fear (COVID-19 Fears Questionnaires for Chronic Medical Conditions).

Results Study participants were predominantly women (83%), younger than 61 years of age (94%). Thirty-six percent of respondents had a pre-existing condition and 5% considered their health status as bad or very bad. Pre-existing conditions and poor perceived health status were associated with increased risk for moderate to severe depressive and anxiety symptoms, fear of COVID-19 and post-traumatic stress symptoms, independently from respondents' age, gender, living area, smoking status, exercise, alcohol consumption and diet.

Conclusions Pre-existing medical conditions and poor perceived health status are associated with increased risk of poor mental health status during the COVID-19 pandemic.

Keywords COVID-19, pre-existing conditions, depression, anxiety, stress

Introduction

COVID-19 pandemic has caused a global health crisis that will continue in the nearest future. People with certain pre-existing medical conditions, such as cardiovascular and pulmonary diseases, obesity and cancer, are at increased risk to experience severe illness, complicated clinical course and poor outcomes from the SARS-CoV-2 infection.^{3,6,10,30,50} Sub-optimal management of pre-existing conditions due to limited access to healthcare resources and social distancing orders during the pandemic is also associated with excess health risks in vulnerable patients.^{4,46,47} Excess mortality from non-COVID-19 related causes has been documented during the COVID-19 pandemic.^{21,36}

COVID-19 pandemic has also caused a global crisis of mental health problems.^{12,20,31,41} Patients with common pre-existing somatic conditions, such as cardiovascular disease and diabetes, are at increased risk for mental health

complications that in turn are associated with elevated risk for disability, poor treatment adherence and unfavorable outcomes from the pre-existing condition.^{5,7,18,27,37} COVID-19 pandemic can increase the risk for new onset mental health complications or exacerbation of pre-existing mental disorder(s) in vulnerable individuals with pre-existing conditions that can subsequently complicate the course and prognosis of the pre-existing condition.^{13,15,20,28,39} It is therefore important to better understand the risks for mental health complications in vulnerable patients with pre-existing condition during the COVID-19 pandemic in order to optimize allocation of resources and possibly attempt to mitigate adverse consequence of the COVID-19.

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The goal of this study was to investigate the association of pre-existing medical conditions and perceived health status with the risk of mental health complications during the second wave of the COVID-19 pandemic. We hypothesized that vulnerable patients with pre-existing conditions and/or poor perceived health status are at increased risk to experience mental health complications during the COVID-19 pandemic due to their greater susceptibility for COVID-19 complications, decreased access to healthcare resources^{3,30,50} and greater baseline level of psychological distress.^{18,27}

Methods

Participants and procedures

Online survey was conducted from October 1 to December 20, 2020. Participants were invited via e-mail invitations, online forums and social network communities (e.g., *Facebook* and *LinkedIn*), and also by employing snow-ball sampling method. Only participants fluent in Lithuanian and 18 years old or older were invited in the study. Respondents were required to register in a study portal (<https://covid-dt.proit.lt/apie-projekta/#PROJEKTAS>) by entering mobile phone number that prompted activation of the study questionnaires. The survey took from 10 to 15 minutes to complete.

The study protocol and its consent procedure were approved by the Bioethics Committee, Kaunas, Lithuania. All study participants gave informed consent prior to proceeding the online survey.

Measures

Pre-existing conditions

Presence of pre-existing medical condition was assessed using the following question: „Do you have any pre-existing medical conditions? “with possible answers of yes or no. Participants who indicated as having a pre-existing condition were asked to indicate their pre-existing condition by selecting one of the possible answers provided in the questionnaire (cardiovascular, pulmonary, obesity, diabetes, mental disorders or other) or by entering free-text.

Perceived health status

Perceived health status was evaluated by asking “How is your health in general?” with possible answers very good, good, fair, bad or very bad. Patients were allowed to select only one answer. Patients were considered as having poor self-perceived health status if they rated their health status as bad or very bad.

Demographic and clinical variables

Respondents were asked to provide information about their gender (possible answers: male or female), age (possible

answers: 18–25 years, 26–40 years, 41–60 years, or 61 or more years) and living area (possible answers: urban or rural). Smoking status was evaluated by asking “Do you smoke?” with possible answers “Yes, every day”, “Yes, sometimes”, “I quit” or “I never smoked”. Exercise was evaluated by asking “How many times per week do you exercise 30 minutes of more?” with possible answers of “Never”, “Once or twice”, “Three or four times” and “Five times and more”. Alcohol consumption was evaluated by asking “How often do you consume alcohol beverages?” with possible answers “Less than once a month”, “2–4 times/month”, “2–3 times/week” and “4 more times/week”. Diet (“How do you rate your diet?”) was rated as very good, good, fair, bad or very bad.

Patient health questionnaire—8

The Patient Health Questionnaire—2 (PHQ-2) and Patient Health Questionnaire—8 (PHQ-8) were used for assessment of depressive symptom severity^{24,22} The PHQ-2 and PHQ-8 are two and eight item, respectively, self-rating questionnaires designed to evaluate depressive symptom severity over the last two weeks with possible answers of not at all (score = 0), several days (score = 1), more than half of the days (score = 2) and nearly every day (score = 3). The PHQ-2 questionnaire evaluates symptoms of anhedonia and depressed mood while the PHQ-8 includes eight items from the original PHQ-9 scale, with the exception of the suicide ideation question because adequate intervention is not possible in online surveys. The PHQ-8 has comparable diagnostic properties to the PHQ-9.⁴⁹ Participants who screened positive using the PHQ-2 (score ≥ 3) were prompted to complete the PHQ-8.²⁶ Respondents who scored ≥ 10 on the PHQ-8 were considered having depressive symptoms as this cut-off was shown to have high sensitivity and specificity for depressive disorders.^{24,26}

Generalized anxiety disorder—7

Generalized anxiety disorder—2 (GAD-2) and Generalized anxiety disorder—7 (GAD-7) questionnaires were used for assessment of anxiety symptom severity over the last two weeks^{23,32}. Participants are asked to rate anxiety symptom severity on the four-point Likert-type scale with possible answers ranging from not at all (score = 0) to nearly every day (score = 3). Participants who scored ≥ 3 on the GAD-2 were prompted to complete the GAD-7. Greater score on the GAD-7 indicates greater anxiety symptom severity. Respondents were considered as having anxiety symptoms if they scored ≥ 10 on the GAD-7.⁴³ The GAD-7 is widely used for assessment of GAD symptom severity in the general population with good psychometric properties³².

Respondents were also classified as having co-morbid depressive and anxiety if they scored ≥ 10 on the GAD-7 and PHQ-8.

Impact of event scale–revised

The Impact of Event scale–revised (IES-R) is a 22-item questionnaire that was used to evaluate subjective distress caused by traumatic events.⁸ All items on the IES-R questionnaire are rated on 5-point scale with possible answers ranging from not at all (score = 0) to extremely (score = 4). Total score on the IES-R questionnaire ranges from 0 to 88 with higher score indicating greater psychological impact of traumatic events. The IES-R has robust psychometric structure and is used for research purposes in Lithuania.^{29,35} We used the IES-R cut-off score of 33 as it was shown to indicate high probability of diagnosis of post-traumatic stress disorder (PTSD).¹¹

COVID-19 fears questionnaires for chronic medical conditions

COVID-19 related fears were evaluated using the COVID-19 Fears Questionnaires for Chronic Medical Conditions (CFQCMC).⁴⁸ It is a 10-item questionnaire that evaluates fears of social isolation, adequate care of pre-existing condition during the pandemic, greater risk of the COVID-19 complications due to pre-existing condition and fear of COVID-19 infection by a patient and close people. Respondents are asked to select a response that reflects how much each statement describes their experience on a typical day in the last week on a five-point numerical scale ranging with possible answers ranging from not at all (score = 1) to extremely (score = 5). The total score of the CFQCMC is the sum of all items and ranges from 10 to 50, with higher scores reflecting greater level of fear of the COVID-19. We considered respondents as having a significant COVID-19 fear if they scored above the median score in our cohort.

AUDIT questionnaire

The AUDIT is a 10-item questionnaire that was designed by the World Health Organization to screen for hazardous alcohol intake in primary health care setting.^{2,38} The AUDIT evaluates alcohol consumption, signs of alcohol dependence and alcohol-related harm. We used a cut-off score of the AUDIT of ≥ 7 because it has been shown to be associated with hazardous alcohol use.⁹

Statistical analysis

We used the binary logistic regression analysis to explore the association of pre-existing conditions (yes vs. no) and perceived health status (bad or very bad vs. very good, good

or fair) with presence of moderate to severe depressive symptoms (PHQ-8 score of ≥ 10), anxiety symptoms (GAD-7 score of ≥ 10), co-morbid depressive and anxiety symptoms (PHQ-8 and GAD-7 scores of ≥ 10), post-traumatic stress symptoms (IES-R score of ≥ 33), COVID-19 fear (CFQCMC score of > 20 [median value in our cohort]) and hazardous alcohol use (AUDIT score of > 7). Next, multivariate binary regression models were adjusted for participants' age, gender, living area, smoking status, exercise, alcohol consumption and diet. In the final multivariate regression models, the pre-existing conditions and perceived health status were considered together. Results of the regression analyses are presented as Odds ratio (OR), 95% Confidence Interval (CI) and p-value.

Statistical analyses were performed with the IBM SPSS Statistics for Windows, Version 27.0 (Armonk, NY: IBM Corp). For all statistical tests, a p value of < 0.05 was considered as statistically significant. Descriptive statistics are presented as the mean and standard deviation (SD) for continuous variables and frequencies and percentages for categorical variables.

Results

In total, 1034 respondents completed the survey (Table 1). Study participants were predominantly women (83%), younger than 61 years of age (94%) and were living in urban areas (73%). Ninety-five percent of respondents considered that their health status was very good, good or fair, while 5% of respondents considered their health status as bad or very bad. Thirty-six percent of respondents had a pre-existing condition. The most common pre-existing conditions were pulmonary diseases (12%) and diabetes (8%). There were 29% of smokers (daily or occasional).

In univariate binary regression analysis, respondents with pre-existing conditions were at increased risk for co-morbid moderate to severe depressive and anxiety symptoms ($p = 0.046$), significant COVID-19 fear ($p < 0.001$) and significant post-traumatic stress symptoms ($p = 0.024$), while respondents with poor perceived health status were at increased risk for moderate to severe depressive ($p < 0.001$), anxiety ($p < 0.001$), and co-morbid depressive/anxiety symptoms ($p < 0.001$), significant COVID-19 fear ($p < 0.001$), post-traumatic stress ($p < 0.001$) symptoms, and hazardous alcohol use ($p = 0.014$) (Table 2).

After adjusting for respondents' age, gender, living area, smoking status, exercise, alcohol consumption and diet, pre-existing medical conditions were associated with significantly increased risk for moderate to severe depressive ($p = 0.001$), anxiety ($p = 0.003$), and co-morbid depressive/anxiety

Table 1 Baseline demographic and clinical characteristics of the study cohort (n = 1034)

Characteristic	Number	%
Age		
18–25 years	379	36.7
26–40 years	270	26.1
41–60 years	325	31.4
61 or more years	60	5.8
Gender		
Men	176	17.0
Women	858	83.0
Living area		
Urban	756	73.1
Rural	278	26.9
Perceived health status		
Very good	152	14.7
Good	532	51.5
Fair	303	29.3
Bad	41	4.0
Very bad	6	.6
Pre-existing conditions		
None	659	63.7
Pulmonary	120	11.6
Obesity	23	2.2
Diabetes	83	8.0
Mental health	8	.8
Other	141	13.7
Smoking status		
Everyday	183	17.7
Sometimes	122	11.8
Former smoker, quit	224	21.7
Never smoked	505	48.8
Exercise of 30 minutes or more		
Never	406	39.3
1–2 times/week	414	40.0
3–4 times/week	144	13.9
5 or more times/week	70	6.8
Alcohol consumption		
Never	173	16.7
Less than once a month	414	40.0
2–4 times/month	324	31.3
2–3 times/week	102	9.9
4 more times/week	21	2.0
Diet		
Very good	86	8.3
Good	400	38.7
Fair	437	42.3
Bad	96	9.3
Very bad	15	1.5

symptoms ($p < 0.001$), significant COVID-19 fear ($p < 0.001$) and symptoms of post-traumatic stress ($p = 0.003$). Poor perceived health status was independently associated with increased risk for moderate to severe depressive ($p < 0.001$), anxiety ($p < 0.001$), and co-morbid depressive/anxiety symptoms ($p < 0.001$), significant COVID-19 fear ($p = 0.001$) and post-traumatic stress ($p < 0.001$) symptoms.

Next, we investigated independent predictive value of pre-existing conditions and self-perceived health status for mental health status during the COVID-19 pandemic (Table 3). Pre-existing conditions and perceived health status were independent predictors of moderate to severe depressive ($p \leq 0.008$) anxiety ($p \leq 0.016$) and co-morbid depressive/anxiety symptoms ($p \leq 0.001$), significant COVID-19 fear ($p \leq 0.004$) and post-traumatic stress ($p \leq 0.014$) symptoms.

Discussion

Main findings of this study

Pre-existing conditions and poor perceived health status were associated with increased risk for moderate to severe depressive, anxiety and posttraumatic stress symptoms, and COVID-19 fear independently from demographic and behavioral characteristics considered in this study. Poor perceived health status was a stronger predictor of poor mental health outcomes than pre-existing conditions.

What is already known on this topic

Pre-existing conditions can be associated with increasing risk of mental health complications during the COVID-19 pandemic.^{40,28} An online survey from Bangladesh found higher prevalence of depressive and anxiety symptoms, and stress (the DASS-21 questionnaire) in 395 respondents with chronic pre-existing conditions when compared to 395 age, gender and residence matched controls.⁴⁰ On the other a hand, a survey performed between March and May, 2020 in Greece in 163 patients with various pre-existing conditions and 943 healthy individuals using the 4-Dimensional Symptom Questionnaire did not find differences in depressive and anxiety symptom severity between two groups, while respondents with pre-existing conditions had greater level of distress and somatization.²⁸

Poor perceived health status and frailty are associated with worse mental health sequelae and greater mortality risk due to the COVID-19 infection. In one study worse perceived health status was associated with greater depressive symptom severity in a cohort of elderly individuals in Iran.¹ A study from Hungary reported that lower perceived health status was associated with greater threat of COVID-19 in

Table 2 Univariate and multivariate regression analysis demonstrating the association of pre-existing condition and perceived health status with mental health complications during COVID-19 pandemic

	<i>Pre-existing condition</i>		<i>Bad or very bad perceived Health Status</i>	
	<i>Univariate</i>	<i>Multivariate^a</i>	<i>Univariate</i>	<i>Multivariate^a</i>
Depression	1.152 [0.865–1.534] 0.334	1.718 [1.241–2.380] 0.001	7.543 [3.969–14.335] < 0.001	7.066 [3.496–14.282] < 0.001
Anxiety	1.188 [0.875–1.614] 0.269	1.651 [1.180–2.312] 0.003	5.554 [3.050–10.112] < 0.001	4.973 [2.603–9.501] < 0.001
Depression and Anxiety	1.418 [1.007–1.999] 0.046	2.065 [1.416–3.011] < 0.001	7.234 [3.965–13.197] < 0.001	6.180 [3.090–12.360] < 0.001
COVID-19 fear	2.172 [1.676–2.815] < 0.001	2.072 [1.575–2.725] < 0.001	3.471 [1.747–6.897] < 0.001	3.238 [1.603–6.543] 0.001
Post-traumatic stress symptoms	1.403 [1.045–1.884] 0.024	1.609 [1.174–2.205] 0.003	5.387 [2.951–9.836] < 0.001	4.561 [2.457–8.469] < 0.001
Hazardous alcohol use	1.067 [0.737–1.546] 0.730	1.479 [0.948–2.307] 0.085	2.343 [1.185–4.633] 0.014	1.441 [0.617–3.369] 0.399

^a—adjusted for age, gender, living area, smoking status, exercise, alcohol consumption and diet.

Table 3 Multivariate regression of mental health outcomes with pre-existing conditions and perceived health status considered together^a

	<i>Pre-existing condition</i>	<i>Bad or very bad perceived Health Status</i>
Depression	1.574 [1.127–2.198] 0.008	6.430 [3.171–13.040] < 0.001
Anxiety	1.526 [1.081–2.152] 0.016	4.556 [2.376–8.739] < 0.001
Depression and Anxiety	1.878 [1.273–2.768] 0.001	5.876 [3.016–11.449] < 0.001
COVID-19 fear	2.000 [1.518–2.635] < 0.001	2.845 [1.394–5.805] 0.004
Post-traumatic stress	1.495 [1.084–2.062] 0.014	4.196 [2.250–7.826] < 0.001
Hazardous alcohol use	1.454 [0.929–2.276] 0.101	1.325 [0.565–3.106] 0.517

^a—adjusted for pre-existing condition, perceived health status, age, gender, living area, smoking status, exercise, alcohol consumption and diet.

the general population.⁴⁵ Poor self-perceived health status is a strong indicator of frailty.^{14,51} The COVID-19 in Older PEople (COPE) study in 1564 patients with COVID-19 has shown that increasing frailty (measured with the clinical frailty scale) was associated with increasing 7-day mortality risk.¹⁹ Another study in 18,234 elderly (≥ 65 years) patients hospitalized for COVID-19 in Turkey reported dose–response association between frailty (evaluated using the Hospital Frailty Risk Score) and in-hospital mortality that ranged from 12% to 31% in patients with low vs. higher hospital frailty risk.²⁵ Higher frailty remained associated with greater mortality risk independently from age, sex, and comorbidities.

What this study adds

We found that respondents with pre-existing conditions were at 1.5 to 2-fold increased risk for moderate-to-severe depressive, anxiety and PTSD symptoms, and greater fear of

COVID-19. Different results in a study from Greece²⁸ when compared to our findings can be partially explained by cultural and societal differences, as well as different study timing and questionnaires used for assessment of mental health symptoms. Greater risk for significant mental symptoms in vulnerable patients with pre-existing conditions can be explained by greater fear of the COVID-19 infection and its complications as well as fear of suboptimal management of their pre-existing disease. Indeed, in our study, patients with pre-existing conditions were at 2-fold higher risk for elevated fear of COVID-19. Wu with colleagues in a study of 787 patients with scleroderma (autoimmune disease that requires prolonged immunosuppressive therapy) found that fear of severe complications, need for longer isolation because of the pre-existing condition and sub-optimal management of the pre-existing condition in case of COVID-19 infection were most frequently rated as extreme fears.⁴⁸ Greater COVID-19 fear was also associated with greater depressive

and anxiety symptom severity. Fear is an important and reasonable reaction of patients with pre-existing condition during the COVID-19 pandemic that can predispose patients to experience significant mental health symptoms and/or disorders. It is therefore important to better understand fears and mental health risks of vulnerable patients with pre-existing conditions during the COVID-19 pandemic in order to optimize their care and improve long term prognosis.

Poor self-perceived health status was associated with 3 to 7-fold increased risk to experience moderate to severe depressive, anxiety and post-traumatic symptoms independently from demographic status and health behaviors. Individuals with poor perceived health are vulnerable to perceive greater threat and fear of COVID-19 that can subsequently translate into increasing levels of mood and anxiety symptoms and stress. Therefore, patients with poor perceived health status should be considered at elevated risk for adverse mental health outcomes during the COVID-19 pandemic. Optimization of health status before global health crises, such as the COVID-19 pandemic, can potentially help to decrease fear and increase resilience for direct and indirect adverse health outcomes during the crisis.

Poor perceived health status was associated with greater odds (4 to 6-fold increased risk) to experience significant depressive, anxiety and post-traumatic stress symptoms than pre-existing conditions (1.5 to 2-fold increased risk), independently from each other and demographic characteristics and health behaviors considered in this study. These results can be explained that pre-existing conditions in our cohort included a spectrum somatic disorders ranging from well-controlled endocrine disorders to cancer, and due study design we were unable to objectively assess severity and stage of pre-existing conditions. On the other hand, self-perceived health status is a subjective perception of one's health, and can be a stronger predictor of COVID-19 fear and patient-centered mental health sequelae that was measured using self-reported questionnaires. Consideration of one's perception about his/her health status should be considered together with objective assessment of underlying pre-existing condition when estimating risk to experience adverse mental health sequelae during the COVID-19 pandemic.

Pre-existing conditions and poor perceived health status were not associated with increased risk for hazardous alcohol use. Harmful use of alcohol is associated with increased risk of mental disorders^{17,16} and can increase exacerbation risk of pre-existing somatic and psychiatric conditions.^{34,42} Alcohol consumption increased during the COVID-19 pandemic; however, alcohol use can be different as a function of health status because patients with pre-existing conditions might

avoid excessive alcohol consumption in order to optimize their health status.^{33,44} Further studies are warranted to clarify alcohol use patterns during the COVID-19 pandemic as a function of pre-existing conditions.

Limitations of this study

Assessment of pre-existing conditions was subjected to recall bias because they were determined by self-report. A study using face-to-face interviews can be challenging considering global recommendation of social distancing that is particularly important for patients with pre-existing conditions. The majority of our participants were younger than 61 years of age, indicating that elderly individuals, who are at increased risk for co- and multi-morbidities and COVID-19 complications, were under-represented. Online survey methods are typically biased towards younger participants with adequate digital literacy. Studies exploring mental health complications imposed by the COVID-19 pandemic in elderly individuals with pre-existing conditions should consider using traditional paper-and-pencil surveys delivered via mail, and other information technologies, such as phone interviews and text messages. Finally, our cohort was heterogeneous as a function of pre-existing conditions and their severity. Identification of COVID-19 associated mental health complications across types and severities of a pre-existing conditions is encouraged. On the other hand, a mix of pre-existing conditions in our cohort represents real-life scenario. Considerable sample size and the use of well-established questionnaires are important strengths.

Conclusions

Pre-existing conditions and poor health status are associated with greater risk for depression, anxiety, COVID-19 fear and posttraumatic stress symptoms independently from each other, age, gender and health behaviors. Poor health status is associated with greater odds to experience mental health complications during the COVID-19 pandemic when compared to the diagnosis of a pre-existing condition. Further studies are warranted to specify mental health consequences of the COVID-19 pandemic in patients with pre-existing conditions, and to identify the most vulnerable populations for the COVID-19 pandemic related mental health complications.

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