

## Original Article

# Mental well-being among patients with congenital heart disease and heart failure during the COVID-19 pandemic

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**Abstract:** Patients with congenital heart disease (CHD) show increasing survival. We evaluated the influence of COVID-19 confinement on the mental well-being of patients with CHD. Descriptive, cross-sectional, observational epidemiological study in a cohort of 242 patients with CHD over 14 years old recruited consecutively from a single adolescent and adult CHD outpatient unit. Patients were sent an online questionnaire to determine clinical, demographic and the 12-element general health questionnaire (GHQ-12) data during the COVID-19 quarantine. 242 out of 407 (59%) patients with CHD, to whom the questionnaire was sent, responded to the survey. 98 (42%) patients were between 14 and 24 years old and 133 (58%) were over 25 years old. Of the total, 119 (51%) were male. 123 (51%), 88 (36%) and 31 (13%) patients with CHD had mild, moderate, and severe anatomical complexity respectively. 11 (4.5%) out of 242 patients with CHD presented heart failure (HF) symptoms, requiring 18% of them admission to the hospital emergency department during the pandemic ( $P=0.002$ ). In relation to the GHQ-12 questionnaire, patients with CHD and HF enjoyed less their daily activities (81% vs. 51%,  $P=0.043$ ) and had less self-confidence (46% vs. 18%,  $P=0.041$ ) than those without HF symptoms. In conclusion, patients with CHD and HF, during the COVID-19 quarantine, presented a lower capacity to enjoy daily activities and self-confidence than CHD without HF symptoms.

**Keywords:** Congenital heart disease, heart failure, GHQ-12, mental health, quality of life

## Introduction

Historically, very few children with complex congenital heart disease (CHD) survived into adulthood. However, the enormous advances in diagnosis and treatment achieved in recent decades, by pediatric cardiologists and cardiac surgeons, have caused the adult population to increase progressively [1-3]. However, despite the successes achieved, challenges such as arrhythmias, pulmonary arterial hypertension, endocarditis, or heart failure (HF) remain [4, 5].

The diagnosis of HF in general has an important impact on the psychological sphere of the patient [6]. In fact, the presence of depression is common and is associated with a worse prognosis [7-9], social isolation, poor adher-

ence to treatment and a lower level of self-care measures.

Maintaining a good quality of life, both physical and mental, is as important as survival for most patients living with chronic diseases, including patients with CHD and HF [10, 11]. COVID-19 outbreak, and the mandatory quarantine imposed in Spain on March 14, 2020, have brought tremendous psychological pressure on the general population, which can significantly affect their mental health [12-14].

The objective of this study is to evaluate the impact on psychological state of CHD patients with and without HF during the COVID-19 quarantine by performing an online mental health questionnaire.

## Methods

### Subjects

Descriptive, observational epidemiological study with a cross-sectional design. Inclusion criteria included clinically stable CHD patients, older than 14 years and with a CHD verified with imaging tests recruited consecutively from a single adolescent and adult CHD outpatient unit between October 2018 and April 2019. Information about the study objectives and the procedure was provided to the participants, followed by their informed consent to participate. Patients that either were unable to answer the survey, who did not want to participate or with co-morbidity problems that limited their life expectancy were excluded from the study. The online survey was sent by email on April 14, 2020, and a reminder was issued the following week encouraging people to respond to the questionnaire. Once submitted, patients had two weeks to submit their responses. The protocol of the study was approved by the Hospital's Ethics Committee (code of research ethics 2020-170-1).

### Clinical data

The following variables were determined: age, sex, type of CHD, hospitalization due to HF or the need to increase diuretic doses in the 12 months prior to national quarantine, New York Heart Association (NYHA) functional class, the need of previous cardiac treatment (surgery or percutaneous treatment), the number of cardiac surgeries, the implantation of cardiac devices (pacemaker or implantable cardioverter defibrillator (ICD)), physical exercise during the pandemic, having a balanced/healthy diet and having COVID-19 symptoms. CHD were classified as mild, moderate, or severe according to the recently developed AHA/ACC guidelines [15]. The New York Heart Association (NYHA) functional class was divided according to the patient's limitation to physical exercise into four classes (class I: without limitation; II: mild limitation; III: marked limitation and IV: inability to do any physical activity).

### 12-item general health questionnaire (GHQ-12)

The 12-item General Health Questionnaire (GHQ-12) is a widely used screening instrument for common mental disorders. Its brevity makes it attractive for use in busy clinical settings, as

well as in settings where patients need help completing the questionnaire [16]. GHQ-12 assesses the current mental state and asks whether that differs from the usual state. The GHQ-12 comprises 12 questions, shown in **Table 1**, that describe mood states covering four identifiable elements of distress: depression, anxiety, social impairment and hypochondria, six of which are written in a positive way and six in a negative way. Each element of the GHQ-12 has four possible response options. Item scores were coded according to the GHQ scoring method (all items coded 0-0-1-1) [17]. The GHQ-12 shows adequate reliability and validity for its use in the Spanish population and can be used effectively to assess the general psychological well-being of the population and to detect non-psychotic psychiatric problems [18].

### Statistical analysis

The qualitative variables were expressed in percentages. The quantitative variables were expressed as median and quartiles (25-75). Possible associations between categorical variables were evaluated using the Pearson's chi-square test ( $X^2$ ) or Fisher's test. Patients with CHD were dichotomized into patients without HF and patients with HF (patients who needed hospital admission due to HF or required an increase in diuretic doses the 12 months previous to the COVID-19-related lockdown). A *p* value less than 0.05 was considered statistically significant. Data analysis was carried out using SPSS 24.0 (SPSS, Chicago, IL).

## Results

### Subjects

The sample of this study included a total of 407 patients older than 14 years with CHD. 242 out of the 407 (59%) patients with CHD to whom the questionnaire was sent electronically responded to the survey. 156 patients did not answer it, 2 patients did not give their written consent to participate, and 7 patients did not complete the entire GHQ-12 questionnaire. 123 (51%), 88 (36%) and 31 (13%) patients with CHD had mild, moderate or severe anatomical complexity, respectively (**Table 2**). In the last year, 8 patients required hospitalization due to HF and 3 patients needed to increase the diuretic treatment in the previous 12 months.

## Mental health and COVID-19 in patients with congenital heart disease

**Table 1.** Demographic, clinical and GHQ-12 questionnaire data in CHD patients with and without heart failure in the 12 months prior to the coronavirus pandemic

	Heart failure*		p
	No	Yes	
Number of patients, n	231	11	
Age, n (%)			0.368
14 to 24 years	98 (42)	3 (27)	
> 25 years	133 (58)	8 (73)	
Sex (male), n (%)	119 (51)	5 (45)	0.764
NYHA functional class (> 2), n (%)	29 (13)	5 (45)	0.010
CHD complexity, n (%)			0.228
Mild	117 (51)	6 (55)	
Moderate	86 (37)	2 (18)	
Severe	28 (12)	3 (27)	
Previous cardiac surgeries, n (%)			0.214
None	44 (19)	0 (0)	
Cardiac surgery ≤ 14 years	136 (59)	8 (73)	
Cardiac surgery > 14 years	33 (14)	3 (27)	
Percutaneous treatment	18 (8)	0 (0)	
Number of cardiac surgeries	1 (1-2)	2 (1-2)	0.148
ICD or pacemaker, n (%)	20 (9)	2 (18)	0.475
Hospital admission during the pandemic, n (%)	5 (2)	2 (18)	0.002
COVID-19 symptoms, n (%)	8 (3)	1 (9)	0.263
GHQ-12 questionnaire, n (%)			
Able to concentrate (less or much less than before)	56 (24)	2 (18)	0.645
Loss of sleep from worry (somewhat more or less than before)	100 (43)	4 (36)	0.763
Play a useful role (less or much less than before)	36 (16)	2 (18)	0.686
Able to make decisions (less or much less than before)	18 (8)	1 (9)	0.601
Constantly feeling under tension (somewhat more or more than before)	77 (33)	5 (45)	0.517
Could not overcome difficulties (somewhat more or more than before)	53 (23)	4 (36)	0.293
Able to enjoy daily activities (less or much less than before)	117 (51)	9 (81)	0.043
Able to cope with problems (less or much less than before)	35 (15)	4 (36)	0.082
Feeling unhappy and depressed (something more than before)	105 (45)	4 (36)	0.758
Losing confidence (something more or more than before)	42 (18)	5 (46)	0.041
Thinking of yourself as worthless (something more or more than before)	32 (13)	2 (18)	0.657
Feeling reasonably happy (less or much less than before)	36 (16)	2 (18)	0.817
Exercising (regularly or sporadically), n (%)	167 (72)	9 (82)	0.732
Balanced and healthy diet (regularly), n (%)	124 (54)	8 (73)	0.148

n: number of patients. \*Heart failure that requires hospital admission or the need to increase diuretic treatment the year before the coronavirus pandemic. ICD: implantable cardioverter defibrillator. GHQ-12: 12-item general health questionnaire.

### Demographic and clinical data

In relation to demographic and clinical data no significant differences were seen in age, sex, CHD complexity, the need for cardiac surgery or percutaneous treatment, the number of cardiac surgeries or being an ICD or pacemaker carrier, regular exercises and having a balanced health diet between CHD patients with and without heart failure (**Table 1**).

During the study period, 9 CHD patients out of 242 (4%) had COVID-19 symptoms (3 with negative polymerase chain reaction (PCR) and 6 without PCR study).

### GHQ-12 questionnaire

In relation to the GHQ-12 questionnaire **Table 1** shows that patients with CHD and HF were less able to enjoy daily activities (P=0.043) and had

**Table 2.** Congenital heart defects according to anatomical complexity

Types of congenital heart disease	Number of patients	Percentage (%)
Mild defects	123	51
Aortic valve disease	27	
Pulmonary valve disease	17	
Atrial septal defect	20	
Ventricular septal defect	37	
Ductus arteriosus	4	
Other simple defects	18	
Moderate defects	88	36
Sub and supra valvular aortic stenosis	5	
Coarctation of the aorta	21	
Sub and supravalvular pulmonary stenosis	17	
Tetralogy of Fallot	40	
Ebstein disease	2	
Atrioventricular septal defect	3	
Complex defects	31	13
Dextro transposition of the great arteries	11	
Levo transposition of the great arteries	8	
Pulmonary atresia	4	
Single ventricle	5	
Truncus	2	
Doble outlet right ventricle	1	

a greater loss of self-confidence (P=0.041) than CHD patients without HF. On the contrary, no significant differences were seen in the remaining items of the GHQ-12 survey.

**Discussion**

HF is a devastating condition that causes fatigue, dyspnea, and limitations in the ability of patients to exercise, and in many cases leads to a high number of hospital admissions; notably affecting the quality of life of patients who suffer from it, especially in the long term [11, 12].

Currently there is no bibliography that relates in patients with CHD the association of HF with mental health. However, due to the increasing number of patients with heart failure, seen in the general population, and the enormous burden that this disease implies for the health system, management programs are being developed to reduce the variability in healthcare [19].

Previous studies have shown that in HF patients quality of life decreases as NYHA functional class worsens [12]. Similarly, other authors have concluded that a poor functional class is a prognostic factor for anxiety and depression, since a worsening of the symptoms leads to social isolation, loneliness, and a poor adaptation to chronic diseases [20]. Although no significant differences were seen in feeling unhappy or depressed between our CHD patients with and without HF we did see a lower ability to enjoy daily activities, in addition to a loss of confidence, which may entail psychosocial consequences such as stress, anxiety or a decrease in the quality of life [21].

In this context the Spanish National Health Survey carried out in 2017 observed, through the GHQ-12 survey carried out in the general population, that disabled individuals had worse

scores than healthy patients [22]. Similarly, functional disability is common in patients with HF, can progress over time, and is associated with an adverse prognosis [23]. Using this insight, other authors concluded that individuals in HF tend to present worsening of their quality of life along the evolution of the disease [24] being age, duration of HF, physical symptoms, and depression important predictors of quality of life [25]. Likewise, the rate of depression in the general population with heart failure is 25%, and in patients where this is advanced or serious, depression or depression-anxiety disorder rates are more than 50% [26]. However, it appears that it is the functional status associated with the heart defect rather than the heart defect itself what shapes the outcomes [27]. In fact, in our series no significant differences were seen between CHD complexity, previous cardiac surgery or ICD/pace-maker implantation and HF. Therefore, HF should be an alarm sign of mental health problems in patients with CHD regardless of additional considerations.

As depression has been found to be frequent during the COVID-19 quarantine among patients with CHD, with only a third of them being under anxiolytic or antidepressant treatment [28], we should emphasize the importance of self-care management behaviors and provide practical information on self-care management to patients and families with HF given the fact that a risk already exists among patients with CHD.

There are, however, limitations in our study that may impact our findings. Firstly, the low number of patients with HF in our series. Secondly, although a great heterogeneity has been reported in online surveys it is usually less than 10%. On the contrary, online questionnaires allow a greater number of responses to be collected at a low cost especially during pandemics [29]. Finally, patients with CHD represent a very heterogeneous population which may lead to difficulty in data analysis.

In conclusion, in our study we have found that patients with CHD and HF are at a higher risk of mental health impairment presenting a lower capacity to enjoy daily activities and self-confidence than CHD without HF symptoms. Therefore, to control HF symptoms seems to be an important part of a mental well-being in patients with CHD independently of the underlying anatomical cardiac defect.

### Disclosure of conflict of interest

None.

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## Mental health and COVID-19 in patients with congenital heart disease

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